INVESTIGATING THE EFFECTS OF INDIVIDUAL INTEREST AND GOAL-ORIENTATION ON ORDINARY AND WORTHY PERFORMANCE

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ABSTRACT

INVESTIGATING THE EFFECTS OF INDIVIDUAL INTEREST AND GOAL-ORIENTATION ON ORDINARY AND WORTHY PERFORMANCE

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This dissertation aimed to investigate whether individual interest and achievement-goal orientations facilitate learning and task performance. Through quasi experimental design, we tested the hypothesized effects of individual interest, achievement-goal orientations, and their interactions on rote learning, meaningful learning, and worthy performance distinctly. In this investigation, 187 participants were grouped based upon their individual interest levels (high vs low) and achievement-goal orientations (achievement-mastery vs achievement-performance) toward four-weeks lasting *Online Critical Information Seeking and Reporting* course. Participants' achievement goals were preserved and even sharpened while they were taking the course through respective manipulations. The research revealed achievement-goal orientation has moderate effect on rote learning outcomes in favor of performance-goal orientated participants. In similar vein, high interested participants' rote learning outcome mean score was significantly higher than low interested participants' rote learning outcome mean score. Then, in a second research line, the study revealed statistically significant individual interest and interaction effects (individual interest*achievement-goal orientation) on meaningful learning outcomes of participants. Therefore, we chose to ignore the individual interest main effect and instead examined the individual interest

simple main effects—which is the investigation of individual interest effects on mastery-goal and performance-goal conditions separately. These analyses assured that individual interest has high effect on meaningful learning outcomes within only mastery-goal oriented participants in favor of high individual interest. Additionally, experiment performed in a computer laboratory setting has provided an empirical evidence that, participants with the higher level of individual interests demonstrated higher worthy performance (task performance divided by exerted cognitive effort) than the participants with lower level individual interest. The results of the study also indicated that mastery-goal oriented participants performed significantly higher on the performance task than performance-goal oriented participants as long as the performance is considered along with its cognitive cost.

Keywords: Individual interest, Achievement-goal orientation, Rote learning, Meaningful learning, Performance, Worthy performance, and Cognitive effort

ÖZ

BİREYSEL İLGİ VE HEDEF YÖNELİMLERİNİN PERFORMANSA VE ETKİN PERFORMANSA ETKİSİNİN İNCELENMESİ

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Bu tez çalışmada öğretmen adaylarının bireysel ilgi ve başarı-hedef yönelimlerinin öğrenmeye ve etkin performansa etkileri araştırmaktadır. Yarı deneysel olarak desenlenen bu çalışma, bireysel ilgi ve hedef-düzenlemenin ezbere dayalı öğrenme çıktılarına, anlamlı öğrenme çıktılarına ve etkin performansa olan etkilerini ayrı ayrı test etmeyi amaçlamaktadır. Bu araştırmada, 187 öğretmen adayı dört haftalık *Online Bilgi Arama ve Raporlama* dersine olan bireysel ilgileri (yüksek - düşük) ve dersteki başarı hedef yönelimlerine (uzmanlık hedefi - performans hedefi) göre gruplandırılmışlardır. Katılımcıların başlangıçta var olan hedef yönelimlerini korumak ve hatta güçlendirmek için dört haftalık ders süresince literatürde tavsiye edilen manipülasyonlar uygulanmıştır. Araştırma bulguları hedef yönelimlerinin ezbere dayalı öğrenme çıktılarına performans-hedefi lehine orta düzeyde bir etkisi olduğunu göstermiştir. Bireysel ilginin ise ilgisi yüksek olan katılımcılar lehine benzer ama nispeten daha küçük bir etkiye sahip olduğu görülmüştür. Bu iki değişkenin anlamlı öğrenme çıktıları üzerine olan etkileri toplanan veriler üzerinden analiz edildiğinde, etkileşim etkisinin yanında sadece bireysel ilginin etkili olduğu görülmüştür. Etkileşim etkisi istatistiksel olarak anlamlı olduğundan, bireysel ilginin anlamlı öğrenme çıktılarına etkisi uzluk hedefi ve performans hedefi yönelimi olan gruplarda ayrı ayrı analiz edilmiştir. Bu analizlere göre, bireysel ilgi sadece uzmanlık

hedef yönelimli katılımcılar arasından bireysel ilgi düzeyi yüksek olan grup lehine anlamlı bir etkiye sahiptir. Ayrıca, bilgisayar laboratuvarında gerçekleştirilen deneyde, bireysel ilgisi yüksek olan katılımcılar düşük olan katılımcılara göre ve uzmanlık hedef yönelimi olan katılımcılar performans hedef yönelimi olan katılımcılara göre daha etkin performans göstermişlerdir. Etkin performans ortalama puanları farkı istatistiksel olarak anlamalı düzeyde olup etki büyüklüklerinin sırasıyla orta ve düşük olduğu görülmüştür. Bu çalışmanın bulgularının öğrencilerin öğrenme ve performanslarının optimize edilmesine ışık tutacağını ümit etmekteyiz.

Anahtar Kelimeler: Bireysel ilgi, Başarı hedef yönelimleri, Ezbere dayalı öğrenme, Anlamlı öğrenme, Performans, Etkin performans ve Bilişsel efor

To my beloved son Ceyhun Arhan AKBAY…

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TABLE OF CONTENTS

LIST OF TABLES

TABLES

LIST OF FIGURES

FIGURES

CHAPTER 1

INTRODUCTION

This chapter presents the background of the study, statement of the problem, purpose of the study, research questions and hypotheses, and significance of the study, and definition of important terms as an introduction of the dissertation

1.1. Background of the Study

What kinds of enablers do allow people to sustain drastic engagement in video games with sleepy eyes? Why do not they drop it off and get into bed? Some people spend hours to solve a puzzle whereas others are mentally knuckled down and quit. When people encounter with a challenging task, indeed, they either continue to work on it or give it up. The reason behind it is exertion of mental and physical effort through self-controlled processes.

People feel more taxed when they exert more effort (O'Keefe & Linnenbrink-Garcia, 2014). Theoretically, any performed behavior requires more effort than not performing that behavior. For instance, solving a math equation requires more effort than not attempting to solve it. On the contrary, in some circumstances, holding oneself back from performing desired behavior involves more exertion of effort than mere passive inaction; because abstaining from behaving requires self-control (Muraven & Baumeister, 2000). The best-known example for refraining from desired behavior through self-control is that dieters hold themselves from eating as much as they desire. Eating as much as one desire may less effortful than not eating even though eating requires effort for moving hands as well as jaw.

Without self-control, according to Muraven and Baumeister (2000), one would behave the way he or she desires (i.e., may cause failure on delay of gratification), which may be called automotic process. In this regard, self-control is an important determinant between automatic and controlled processes (Bargh, 1994). There are two main

difference between automatic and controlled processes. First, automatic processes are rigid (i.e., desired end) whereas controlled processes are flexible (i.e., whatever the best interest is) and second, automatic processes are efficient whereas controlled ones are costly (i.e., consumption of resources for behaving in a certain way) (Muraven & Baumeister, 2000).

One can behave automatically without self-control, which requires less effort than the controlled behavior. Self-controlled behaviors, on the other hand, require self-regulatory resource depletion (Muraven & Baumeister, 2000; Stucke & Baumeister, 2006) and self-regulatory resources are limited (Muraven, Tice, & Baumeister, 1998; Muraven & Baumeister, 2000). For example, working-out can be considered as self-controlled behavior, which people choose to do for their own sake, and cost self-regulatory resources to deplete. On the contrary, there are other behaviors that require less resource such as lying down and watching television. The second behavior is more desirable if the ultimate goal of the controlled behavior is ignored.

Baumeister, Vohs, and Tice (2007) observed that self-control is vulnerable to exertion as the muscles are. Therefore, they argued that "effortful self-regulation depends on a limited resource that becomes depleted by any acts of self-control, causing subsequent performance even on other self-control tasks to become worse" (p.351). Because the self-regulatory resources has limited capacity, involving in a task that require extensive resources may cause a failure on other tasks requiring self-control (Baumeister et al., 2007; Muraven et al., 1998). As one works on the given task or demonstrates certain behaviors, s/he experiences depletion of self-regulation resource. Thus, depletion of self-regulation may cause ineffective task performance and failure on achievement. To avoid such outcomes, the limited cognitive resources must be restored. In the literature, there are two possible methods for restoring resources; resting (Tyler & Burns, 2009) and positive affect (Tice, Baumeister, Shmueli, & Muraven, 2007).

An individual need to control his or her own behavior through expenditure of limited inner resource to maximize the best interest in a long-term (Muraven & Baumeister, 2000). Overspending of this resource may cause inadequacy at self-controlled behavior. According to Baumeister et al. (2007), inadequate self-control may be associated with behavioral problems, lack of persistence, decrease in task performance, and underachievement. The inner limited resource of strength that controls one's own behavior is limited and its decrease affects the persistence and the performance of an individual in any task. Yet, self-regulation can be optimized via individual interests. Because, interest in any task reduces cognitive effort (Lipstein & Renninger, 2007; Renninger & Hidi, 2002), it may withhold the expenditure of strength source (Hidi, 2016). Therefore, we may claim that interest in any task can increase task performance in consequence of task persistence.

To fully understand the investment of resources toward performance, interest theory has been integrated with another motivational framework: achievement-goal (or purpose-goal) theory. Goal is defined as "what individual is trying to accomplish" and argued that it has a similar meaning to purpose and intent concepts (Locke, Shaw, Saari, & Latham, 1981, p. 126). According to goal-setting theory, goal is "a representation of an end or result that an individual aims to achieve" (Van Yperen, 2003, p. 1006). Goal-orientation, on the other hand, is integrated pattern of beliefs (McWhaw & Abrami, 2001) that results in "different ways of approaching, engaging, and responding to achievement situations" (Ames, 1992, p. 261). Purpose-related goals has two major dimensions which are *mastery-goals* and *performance-goals* (Ames, 1992; Duda, 2001; Pintrich & Schrauben, 1992). Mastery-goals focus on learning challenge and curiosity (McWhaw & Abrami, 2001) and ultimately "development of competence through task mastery" (Elliot & McGregor, 2001, p.501). Therefore, mastery-goal orientation has been also called in literature as learning or intrinsic goal-orientation. On the other hand, performance-goals focus on grades, rewards or approvals (Mcwhaw & Abrami, 2001) and ultimately "demonstration of competence relative to others" (Elliot & McGregor, 2001, p. 501).

Because performance-goal orientation is associated with external means, such as rewards, it has been called as extrinsic goal-orientation.

Approaches to learning, effective from the work of Marton and Saljö (1976), have been characterized in the continuum of surface-to-deep (Huang, Ge, & Law, 2017). John Biggs has described different types of student approaches to learning and studying. Among those types, surface and deep approaches were predominantly studied in leaning and motivation literature. Surface approach to learning defined as an approach yields students to learn just enough to pass a test or fulfill the minimum requirements of the course or program in order to avoid failing (Biggs, 1987; Biggs & Tang, 2007; Howie & Bagnall, 2013). On the contrary, deep approach to learning is defined as an approach that revitalizes students to engage with the subject matter and to believe that content worth spending time to understand (Biggs, 1987; Biggs & Tang, 2007; Howie & Bagnall, 2013). Biggs (1987) argued that each motive-strategy combination defines different approach to learning. In another words, approach to learning has two components: motive and strategy. The motive for surface approach, which can be referred as surface motive, is instrumental and its main purpose is meeting minimal requirements (Biggs, 1987). Similarly, Biggs labeled the strategy component of surface approach to learning as surface strategy (1987). Biggs described surface strategy as reproductive because this strategy requires students to reduce content into bare essentials and then reproduce it when needed via rote learning (1987). According to Biggs (1987), deep motive (motive component of deep approach to learning) is intrinsic such that it actualizes interest as well as competence in particular study areas. The focus of deep strategy (strategy for deep approach to learning) is on the meaningfulness of learning. Biggs specified that deep strategy is about reading widely and integrating new information to previously obtained relevant knowledge (1987).

In short, aligned with the types of motives and strategies, the surface learning approach to learning is associated with students' intentions to only cope with the task (i.e., selectively memorization of subjects to meet minimum requirements) to avoid failure

(Briggs, 1987; Marton, 1983; Vanthournout, Doche, Gijbels, & Van Petegem 2014). In contrast, the deep approach to learning highlights the meaningful learning, which focuses on the main themes and principles via use of appropriate strategies for creation of meaning (Asikainen & Gijbels, 2017; Ekinci, 2015; Vanthournout et al. 2014).

1.2. Statement of the Problem

Teacher is the cornerstone for development and education of the next generation (Richardson & Watt, 2006; Paulick, Retelsdorf, & Möller, 2013). To have well-developed and well-educated generation, highly skilled and competent teachers are needed however, training a competent and skilled teacher requires great deal of effort which can be achieved through high motivation. Teacher educators need to be motivated to educate as much as teacher trainees to be motivated for developing competence and skills regarding teaching.

Butler (2007) argued that schools are not for only students to achieve and develop competence, but also arena where teachers to demonstrate eager to succeed at teaching job but definition of success may differ based upon the achievement goal they attain. Hereby, examination of the effects of teachers' achievement goals and other motivational factors such as personal interest in teaching on their performance and the effort are critical. Because, teaching related goals are the predictors for classroom goal structures (Wang, Hall, Goetz, & Frenzel, 2017). Previous studies have ensured that achievement-goals, which is an important motivational factor, matter for students since goals create distinct motivational systems which create qualitative differences for students to define and perceive success, to process information and to regulate behavior (Butler, 2000; 2007). For instance, mastery goal-oriented teachers use more instructional strategies which promotes students' mastery goal orientation (Schiefele, 2010). In contrast, teachers with performance goal-orientation tend to frequently use of performance-oriented methods such as using tangible rewards (Butler, 2012).

However, most of the studies concerned with motivation in education investigated the role motivational factors on achievement and ignored the effect of teacher motivation

on students' learning and performance. Additionally, it is inevitable that, greater performance requires greater effort. Yet, individual interest which is another motivational factor can be used to optimize performance (O'Keefe, Linnenbrink-Garcia, 2014). Through this study, we aimed to investigate the effects of different achievement-goals on ordinary and worthy performances of prospective teachers. Along with achievement goal types, the effects of individual interest on ordinary and worthy performance is investigated. Hereby, influence of interest level on performance and its cost is determined.

1.3. Purpose of the Study

The purpose of this quantitative factorial quasi experimental study is to examine the effects of two motivational components (individual interest and achievement-goal orientation) and their interactions on rote learning, meaningful learning, and worthy performances of undergraduate students. It also investigates the effects of individual interests and achievement-goals on cognitive cost (i.e., cognitive effort exertion, self-regulation depletion, and time spent) investment while performing a given task. Literature review indicated that these issues have not been completely clarified and there are unanswered questions.

This study tackles with specific issues focusing on the effects of individual interest and achievement-goal orientation separately. It will also make distinction between ordinary and worthy performance and their motivational requirements. The ultimate goal of the present study is to make suggestions on assigning students with an adequate achievement-goals based upon their levels of individual interest toward the subject-matter. Hence, the results of the study will provide guidance for strategically optimization of students' learning outcomes and performances.

1.4. Research Questions and Hypotheses

Before conducting experimental research, hypothesized effects of individual interest and achievement-goal orientation on rote learning, meaningful learning, and worthy performance are reviewed. Through the review of literature, a causative hypotheses

model was generated. This predicted causative hypotheses model is provided in Figure 1.1 to provide more comprehensive understanding on the hypothesized causal relations among variables.

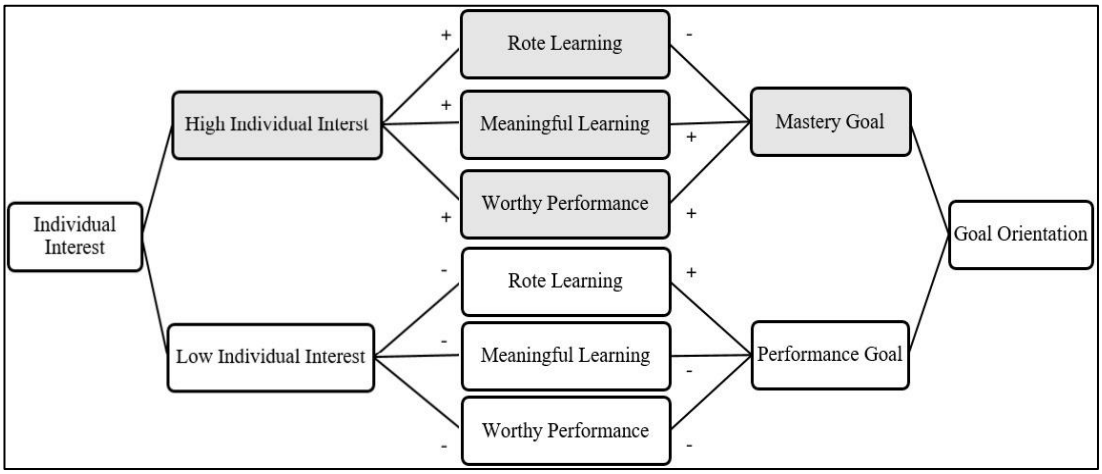

Figure 1.1. Causative Model for Hypotheses

While conducting this study, the following main questions are examined:

1. What is the effect of achievement-goal orientation and individual interest on rote learning?

Based on the first question, the following hypotheses are tested:

- Main effect of individual interest
    - H_0: There is no significant difference on rote learning outcome average scores between high individual interest and low individual interest groups.
    - H_1: There is a significant difference on rote learning outcome average scores between high individual interest and low individual interest groups.
- Main effect of achievement-goal orientation
    - H_0: There is no significant difference on rote learning outcome average scores between mastery goal and performance goal groups.

- H_1: There is a significant difference on rote learning outcome average scores between mastery goal and performance goal groups.

- Interaction effect of individual interest and achievement-goal orientation
  - H_0: There is no significant interaction effect between the levels of individual interest and the factors of achievement-goal orientation in terms of rote learning.
  - H_1: There is a significant interaction effect between the levels of individual interest and the factors of achievement-goal orientation in terms of rote learning.

2. What is the effect of achievement-goal orientation and individual interest on meaningful learning?

Based on the second research question, the following hypotheses are tested.

- Main effect of individual interest
  - H_0: There is no significant difference on meaningful learning outcome average scores between high individual interest and low individual interest groups controlling for prior knowledge.
  - H_1: There is a significant difference on meaningful learning outcome average scores between high individual interest and low individual interest groups controlling for prior knowledge.
- Main effect of achievement-goal orientation
  - H_0: There is no significant difference on meaningful learning outcome average scores between mastery goal and performance goal groups controlling for prior knowledge.
  - H_1: There is a significant difference on meaningful learning outcome average scores between mastery goal and performance goal groups controlling for prior knowledge.
- Interaction effect of individual interest and achievement-goal orientation

- H_0: There is no significant interaction effect between the levels of individual interest and the factors of achievement-goal orientation in terms of meaningful learning controlling for prior knowledge.
- H_1: There is a significant interaction effect between the levels of individual interest and the factors of achievement-goal orientation in terms of meaningful learning controlling for prior knowledge.

3. What is the effect of achievement-goal orientation and individual interest on worthy performance?

Based on the third research question, the following hypotheses are tested.

- Main effect of individual interest
  - H_0: There is no significant difference on worthy performance average scores between high individual interest and low individual interest groups controlling for prior knowledge.
  - H_1: There is a significant difference on worthy performance average scores between high individual interest and low individual interest groups controlling for prior knowledge.
- Main effect of achievement-goal orientation
  - H_0: There is no significant difference on worthy performance average scores between mastery goal and performance goal groups controlling for prior knowledge.
  - H_1: There is a significant difference on worthy performance average scores between mastery goal and performance goal groups controlling for prior knowledge.
- Interaction effect of individual interest and achievement-goal orientation
  - H_0: There is no significant interaction effect between the levels of individual interest and the factors of achievement-goal orientation in terms of worthy performance controlling prior knowledge.

- H_1: There is a significant interaction effect between the levels of individual interest and the factors of achievement-goal orientation in terms of worthy performance controlling prior knowledge.

1.5. Significance of the Study

Previously published studies concerned with achievement goal orientations mostly investigated the relationships between goal-orientation and other learning constructs such as learning perceptions (Pulkka & Niemivirta, 2015), students' engagement in task, persistence (Dweck & Leggett, 1988), preference on challenging task, use of learning strategies (Ames & Archer, 1988; Elliot & McGregor, 2001; Phan, 20009; Soltaninejad, 2015; Somuncuoglu & Yildirim, 1999) and so on. On the contrary, investigation of achievement goal-orientation effects on learning outcomes has not been clarified. The current study intends to fill in this gap in the literature. Furthermore, the current study investigates this issue by distinguishing learning outcomes into rote and meaningful in accordance with surface and deep learning approaches.

Additionally, the current study investigated the effects of achievement-goal orientation on learning and performance along with individual interest which is another motivational factor. Thus, this would enable us to see interaction effect of these two motivational constructs on learning and performance. Even though, the existence of relationship between interest and learning has been recognized by Herbart (1965a; 1965b), the question of does the effect of individual interest on learning and performance differ due to perceived achievement goals remained unanswered. This study aims to answer this question as well.

Next, no doubt that any performance requires effort. In learning itself as well as fulfilling learning tasks, individuals exert cognitive efforts. The extend of the cognitive effort predicts academic achievements, academic grades, performance on the course, memorization, problem solving capacity, cognitive and metacognitive processes, reasoning, and decision making (Cacioppo, Petty, Feinstein, & Jarvis,

1996; Shah & Oppenheimer, 2008; Pyne, Bettman, & Johnson, 1988; Smith & Walker, 1993; Verplanken, Hazenberg, & Palenewen, 1992; Westbrook & Braver, 2015). Although significant relationships between cognitive effort and numerous learning constructs, there is few studies in which the effects of achievement-goal orientation and individual interest on amount of cognitive effort required by learning tasks. The results of the current study provide evidence for optimization of performance as well as cognitive effort needed for performing that task.

In this regard, this study aims to first, investigates simultaneous effects of individual interest and perceived achievement goals on rote and meaningful learning separately, second, evaluates learning task performance along with its cognitive costs, three, defines worthy performance in learning, and last, provide insight for measuring cognitive cost in respect to the attention theory and the strength model of self-control model. Ultimately, the findings of the current study provide evidences for optimization of learning and learning task performance makes recommendations on practical implications for prospective teachers and teacher educators to develop competent generations.

1.6. Definitions of Important Terms

Individual Interest

Individual interest refers to relatively stable orientation of person to attend to certain activity/events or engage in certain object (Krapp, Hidi & Renninger, 1992).

Performance-goal

Performance-goal refers to demonstrating competency which is reflected in comparisons with others (Schutz, 1991).

Mastery-goal

Mastery-goal refers to an accomplishment is derived from the challenge or sheer interest in the task (Ames & Archer, 1988).

Self-control

Self-control refers to the process of deliberately suppressing, overriding, or altering one's own responses (i.e., impulses, thoughts, emotional reactions, actions) in order to meet the standards or desired goals (Baumeister, Vohs, & Tice, 2007; Inzlicht, Schmeichel, & Macrae, 2014; Lindner, Nagy, Arhuis, & Retelsdorf, 2017). As the definition implies, there is a family of behaviors corresponding with self-control, so that, one should not try to single out one specific cognitive process as self-controlled. Yet, even a little resemblance among these family of behaviors can be expected (Kable, 2013).

In the literature, it can be seen that the terms self-control and self-regulation are used interchangeably. Authors making distinction between these two terms portrays self-control as a deliberate and effortful subset of self-regulation (Baumeister et al., 2007). In other words, self-controlled behavior requires intention whereas other self-regulated behaviors do not require intention such as maintaining a constant heartbeat. Heart beat is self-regulated but not self-controlled.

Cognitive Effort

Cognitive effort is defined by Tyler, Hertel, McCallum, and Ellis (1979) as "the amount of the available processing capacity of the limited-capacity central processor utilizes in performing an information-processing task" (p. 608). This definition focuses on the limited capacity of attention in central processor. Alternatively, Lee, Swinnen, and Serrien defined it as "the mental work in making decisions" (1994, p.329). Nonetheless, in cognitive psychology literature, attention has been treated as synonym for effort (Vieira, 2016).

Task Persistence

Task persistence can be defined as "the ability to persist and to sustain attention at a task" (Andersson & Bergman, 2011, p.950). In this study, the term persistence referred

to as task persistence. More specifically, it is the time spent by the participants while they actively engaged in task.

Rote Learning

Rote learning is a strategy that enables students to memorize the content itself without the necessity of understanding it through surface-level cognitive processing (Mcloone & Oluwadun, 2014). Therefore, rote learning is associated with reproductive processing (Kember & Gow, 1989). It takes Biggs' (1987) surface learning approach which focuses on meeting minimal requirements.

Meaningful Learning

Meaningful learning is a strategy that requires students to be engaged in deep-level cognitive processing in order to really understand the content (Mcloone & Oluwadun, 2014). Therefore, meaningful learning is associated with generative processing (Kember & Gow, 1989). It takes Biggs' (1987) deep learning approach which focuses on competence in particular subject.

Worthy Performance

Even though performance is well known variable, "it is not always considered to add value in work situations measured by cost" (Toker, 2017, p.348), according to Gilbert, it is not a smart approach to evaluate performance (2007). Therefore, Gilbert (1996) stated that "human competence is a function of worthy performance (W), which is a function of the ratio of valuable accomplishments (A) to costly behavior (B)" (p.18). The general formula for the worthy performance is W=A/B.

CHAPTER 2

LITERATURE REVIEW

In this chapter, the related literature pertaining to the research questions provided in Chapter One is reviewed. First, Vroom's expectancy theory of motivation is presented. Second, interest and its types are presented and then, consequences of interest within an intentional scope are examined. Third, achievement-goal orientation and types of achievement-goals are defined and clarified. Furthermore, consequences of each achievement-goal type on learning and performance are scrutinized. Then, cognitive effort and related constructs within the intentional scope are defined and elaborated. Causal relationships among the relevant constructs that exist in the literature are synthesized and presented. Finally, previously published relevant studies are summarized.

2.1. Expectancy Theory of Motivation

Motivation can be considered as the driving force for all human beings to behave the way they do since they are psychological beings. Theories of motivation is distinguished broadly into the groups which are content theories and process theories. Content theories such as Maslow's theory of human needs basically focuses on individual needs (Parijat & Bagga, 2014) therefore attempt to explain motivational factors (Lunenburg, 2011). Process theories, on the contrary, deal with cognitive antecedents as well as cognitive processes regarding motivation (Lunenburg, 2011; Parijat & Bagga, 2014). One of the best-known process theories of motivation is Vroom's Expectancy Theory of Motivation.

The expectancy theory is "a theory of motivation proposed by Vroom (1964) to explain the psychological and cognitive processes that an individual will go through to determine the level of effort that he/she will chose to maximize his/her gain" (Barakat & Moussa, 2017, p.36). Vroom's expectancy theory does not concern with

suggestions on variables that motivates people in their work environments. Conversely, Vroom's expectancy theory provides "a process of cognitive variables that reflects individual differences in work motivation" (Lunenburg, 2011, p.1). Hereby, the expectancy theory tries to explain why people choose to demonstrate certain behavior among alternatives. In other words, this theory attempts to explain the underlying cognitive process in which an individual is motivated to do something. This theory identifies several paths that can be followed to motivate people by altering their expectancies on the followings; first, effort will improve performance, second, improved performance will end-up with reward, and third, a reward will be a desired one. If we recapitulate, Vroom theorized that people choose one behavioral option among alternatives if they believe that behavior will lead them to desired end.

Expectancy theory has four assumptions. First, "people join organizations with expectations about their needs, motivations, and past experiences", second, "an individual's behavior is a result of concise choice", third, "people want different things from the organization", and fourth, "people will choose among alternatives so as to optimize outcomes for them personally" (Lunenburg, 2011, p.2). Based upon these assumptions, expectancy theory has three key elements which are expectancy, instrumentality, and valence. The illustration of expectancy theory of motivation can be seen in Figure 2.1.

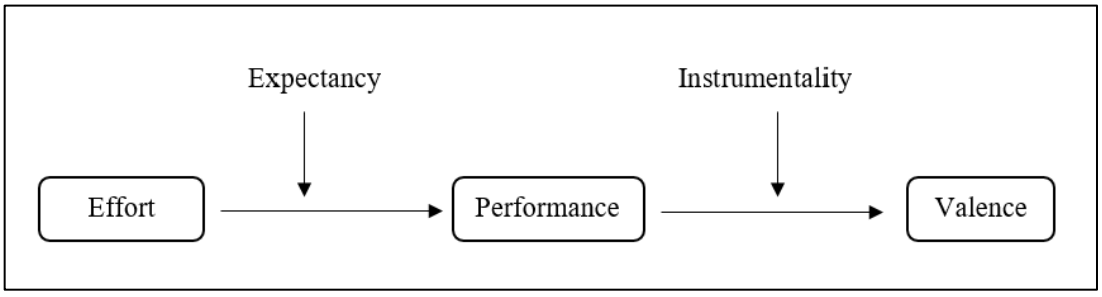

Figure 2.1. Expectancy model.

Note: Adopted from Lunenburg (2011). Expectancy theory of motivation: Motivating by altering expectations

The first element of the theory is expectancy. It is a belief that increase in performance depends on increase in effort a person put forward. An individual probably thinks that if he/she work harder, he/she will perform better. Hereby, expectancy is "a person's estimate of the probability that job-related effort will result in a given level of performance" (Lunenburg, 2011, p.2). Since expectancy is associated with probability, the value of expectancy ranges from zero to one. High expectancy occurs when a person fully believes that the effort will end up with desired performance level and vice versa. Since expectancy is a probability of success and is relied on person's belief, Vroom (1964) defines expectancy as "the subjective probability (because individuals differ in their estimations of the relationship between behavior and outcomes) for the individual's expectation that behavior would lead to a particular outcome (Suciu, Mortan, & Lazar, 2013, p.185).

The second key element of expectancy theory is instrumentality. Lunenburg (2011) defined instrumentality as probability estimation about the effect of achieved performance level on various outcomes and argued that instrumentality value ranges from zero to one. Similar to expectancy, instrumentality value raises as the employee's belief on better performance yields better outcome gets stronger. For instance, if a person strongly believes that a good cumulative grade point average (GPA) will ensures his/her college acceptance, then the value of instrumentality should be closer to +1. On the contrary, if an individual sees that GPA has nothing to do with probability of college acceptance, then the instrumentality between academic performance and outcome gets closer to zero.

The last key element for expectancy theory of motivation is valence. It refers to desirability of outcome that the level of performance yields (Brooks & Betz, 1990). Valence is defined by Lunenburg as "the strength of an employee's preference for a particular reward" (2011, p.3). valence of the reward may differ one individual to another based on the value attributed to reward by an individual. Considering the possibility of given reward being unpleasant to someone while delightful for others,

value of valence ranges from -1 to +1 (Parijat & Bagga, 2014). If the reward makes indifference, then valence of the reward considered as 0 (Lunenburg, 2011).

Vroom (1964) formulates motivation based on the relationships among effort-performance-reward-valence. The formula provided by Vroom (1964) is provided below.

$$Motivation = Expectancy\ x\ Instrumentality\ x\ Valence$$

According to Lunenburg (2011), multiplication effect in the equation generally suggests that;

- When all multipliers (expectancy, instrumentality, and valence) are high-positive, then motivation is high.
- When all multipliers (expectancy, instrumentality, and valence) are low-positive, then motivation is low.
- If any one of multipliers is zero, then overall motivation might be zero.

Parijat and Bagga (2014) made further suggestions for each motivational effects every combination of three multipliers, which are expectancy, instrumentality, and valence. The resultant motivation due to different values of multipliers are given in Table 2.1.

Table 2.1. Resultant motivation due to combination effects of expectancy, instrumentality, and valence

Situation	Valence	Expectancy	Instrumentality	Resultant motivation
1	High-positive	High	High	Strong Motivation
2	High-positive	High	Low	Moderate Motivation
3	High-positive	Low	High	Moderate Motivation
4	High-positive	Low	Low	Week Motivation
5	High-negative	Low	Low	Week Motivation
6	High-negative	High	Low	Moderate Avoidance
7	High-negative	Low	High	Moderate Avoidance
8	High-negative	High	High	Strong Avoidance

Note: Adopted from Newstrom, J. W. & Davis, K. (1999). Organizational Behavior, Human Behaviour at Work, 10th Ed., Tata McGraw Hill Company New Delhi

Consequently, Vroom's expectancy theory of motivation is a process theory in which important aspects of cognitive processes for motivation is elaborated. The theory establishes relationships among effort level-performance-reward-and personal meaning of reward which is associated with personal goals. It proposes that to improve performance, expectancy, instrumentality, and valence should be high because deficiency in any one of these components pull down the positive effects of other components. According to expectancy theory, people do not act due to strong internal drives, needs, or application of rewards; instead, beliefs, perceptions, probability estimates (which are the products of cognitive processes) influence people's acts (Lunenburg, 2011).

From educational standpoint, teachers may alter student's expectancy on effort yields higher academic performance by offering proper and relevant assignment and breaking assignments into manageable parts. Since increase in effort results in higher performance when expectancy is high, optimization of cognitive resources becomes critical because, cognitive resources are limited and cause deficiency in effort exertion. In this respect, the level of individual interest toward subject matter or learning assignments can be used as facilitator for cognitive resource diminishment. Expectancy theory also suggests that the relationship between performance and reward must be high-positive. It also proposes that the value of the reward depends on personal goals. Hereby, to increase academic performance of the students, the rewards must be aligned with student's achievement goals. If the reward or outcome of the learning task is building competence on certain skills and the personal goal of student was avoiding failure, the valence of the outcome would be low for that student. Thus, his/her motivation toward learning will also be low even if he/she has high expectancy and instrumentality.

2.2. Interest

The term interest has been investigated in psychology for a long time. The existence of this concept can be dated back to Herbart who is one of the pioneers of modern psychology (Schiefele, 1991). Even though the concept of interest has been studied for years and is still being studied within the scopes of modern motivational theories, emotion theories, and interest theories. Yet, it is still a vague term.

According to Lazarus (1991), emotions have certain characteristics or components defined by modern theories of emotions, which are "physiological changes, facial and vocal expressions, patterns of cognitive appraisal, a subjective feeling, and an adaptive role across the lifespan" (Silvia, 2008, p.57). Since the interest "has a pattern of cognitive appraisals (Silvia, 2005), a subjective quality (Izard, 1977), and adaptive functions (Sansone & Smith, 2000)", Silvia proposes interest as an eccentric emotion (2008, p.58). Nonetheless, most of the emotion theorists either exclude interest from their major emotions list or deny it being an emotion even though it has a history in emotion psychology (Silvia, 2008).

From aspect of modern motivational psychologists, interest is another term for intrinsic motivation used in public language defined as affective state or personal characteristic and employed by leading intrinsic motivation theorists such as Deci and Ryan, 1985 (Schiefele, 1991). Deci and Ryan (1985) defines the term as "an important directive role in intrinsically motivated behavior in that people naturally approach activities that interest them" (p.34).

In the literature, the terms of interest and motivation often used interchangeably as if they were synonyms (O'Keefe & Linnerbrink-Garcia, 2014) although they are not (Schiefele, 2009). Some theorist argued that motivation is a broader concept which refers to aspiring to engage in goal directed activities in certain situation and sustaining that behavior until the end state (Schunk, Pintrich, & Meece, 2008; Schunk & Mullen, 2013). On the other hand, interest is "a motivational variable refers to the psychological state of engaging or the disposition to reengage with particular classes

of objects, events, or ideas over time" (Hidi & Renninger, 2006, p.112). Because the motivation is broader concept and interest is a variable of it, interest contributes to the motivation. Yet, there are other variables completes the motivation such as goals and motives (O'Keefe & Linnerbrink-Garcia, 2014).

In order to speak of interest, there must be a connection between a human being and content area, in which a person challenge a task, investigates a topic, or involved in a particular domain (Hidi & Baird, 1998; Krapp, 2002). The occurrence of these connections may be attributed to finding personal meaning and relevance in the content area (e.g., task, activity, research area, and topic) and valuing it (Harackiewicz & Hulleman, 2010). Therefore, Hidi and Renninger (2006) suggested that knowledge, positive emotion, and value are the three major factors supporting interest development. They also argued that personal characteristics and social context are important factors for development of interest due to the fact that the interaction between the person and the object designate the extent of interest (2006).

Intrinsic motivation shows similar characteristic with concept of interest because it is also, according to Deci and Ryan (1985), explained by the desire of people to engage in an activity valuable to them. Yet, intrinsic motivation is not a synonym for interest. In the literature, although interest is distinguished from both motivation and intrinsic motivation concepts (see Deci, 1992; Durik & Harackiewicz, 2007; Schiefele, 2009), there is an agreement on those concepts' significantly overlapping characteristics and consensus on their importance on optimum learning to occur (Durik & Harackiewicz, 2007).

Because the focus of current study is on interest concept rather than the motivation, we need to isolate motivating characteristics of interest from the other motivational sources. According to Self-Determination Theory, people motivated to pursue certain activities as long as they satisfy psychological needs of autonomy, relatedness, and competence (Deci & Ryan, 1987), which are precondition for interestingness (Sansone & Thoman, 2005). Deci and Ryan (1987) argued that intrinsically motivated behavior

has no intention to satisfy intrinsic needs but those needs can be satisfied in situations where the people engage in an interesting activity.

Another clarification may be made between the interest concept and general mood. The positive mood mostly associated with the interest experience as Ainley, Hidi, and Berndorff, (2002) suggested, nevertheless, it is not uncommon to experience some negative mood while engaging in interesting activities (Sansone & Thoman, 2005). For instance, even though solving a crossword puzzle is an interesting task for most people, they may still experience some annoyance when they get into difficulties. Murray, Sujan, Hirt, and Sujan (1990) suggested that mood mechanism may affect performance and determines the degree of interestingness of an activity or task. In their research, they found that happy mood participants found the task they applied in the study more interesting than the unhappy or neutral mood participants.

2.2.1. Types of Interest

The researchers studying interest partitioned it into three categories, namely; individual interest, situational interest, and topic interest. The most common and distinct divisions among these three types of interests are individual and situational interests (see Alexander, Kulikowich, & Jetton, 1994; Schiefele, 2009). Individual interest is an emotional state that involves personal connection to content area and relatively stable disposition to engage in the object (e.g., task, activity, research area, topic etc.) (Ainley et al., 2002; Eccles & Wigfield, 2002; Hidi & Renninger, 2006; Renninger, 1992, 2009; Schiefele, 2009). Individual interest is referred to as personal interest in the literature due to its focus on the connection between the person (i.e., researcher) and an activity or domain (i.e., research area of educational technology).

Another frequently mentioned type of interest is situational interest. It is temporary emotional states that emerges from and sustained by the features of the context and the environmental qualities where the activity takes plays (Hidi & Baird, 1986; Hidi & Renninger, 2006; Krapp, 2002; Schiefele, 2009; Hidi & Anderson, 1992; Schiefele, 1996). In contrast to the individual interest' relatively stability, situational interest is

momentarily and context bounded (Harackiewicz & Hulleman, 2010). Because it is derived by the particular features of the environment such as content features or structural features (Ainley et al., 2002). Environmental features may also contribute to existence of individual interest as well. But what differentiates individual interest from the situational interest is the sustainability of the interest when the interesting feature of the environment no longer exists. Individual interest is independent from the situational support and people's interest continues without the support (Linnenbrink-Garcia, Patall, & Messersmith, 2013; O'Keefe & Linnenbrink-Garcia, 2014). For example, one student who has no interest in environmental science class may gain temporary interest through the demonstration taken place in the classroom or sense of humor of presenter. If this interest disappears in different situation even though the topic remains the same, then this interest is situational. But, if the interest remains on the same topic even though the context changes, it can be considered as either individual interest or topic interest. Topic interest is another form of interest less mentioned in the interest literature. This type of interest, according to Ainley et al. (2002), is emerges during the presentation of a topic. It is argued that this type of interest holds some characteristics of both situational and personal interests.

2.2.1.1. Individual Interest

Individual interest is relatively stable orientation of person to attend to certain activity/events or engage in certain object (Krapp, Hidi & Renninger, 1992), and it has two components: value-related valences and feeling-related valences (Schiefele, 1991; 2009; Eccles & Wigfield, 2002; Hidi & Renninger, 2006). The affect-related valences consist of positive feelings or emotional states (e.g., involvement, stimulation, fascination, and excitement) associated with particular activity, object, topic or domain (O'Keefe & Linnenbrink, 2014; Eccles & Wigfield, 2002). On the other hand, value-related valences can be attributed to the personal importance of the object activity, topic or domain and their contribution to the personal development, competence, and helping to solve problem (O'Keefe & Linnenbrink-Garcia, 2014; Eccles & Wigfield, 2002; Schiefele, 1991). At this point, for value-related valences,

relevancy and meaningfulness of the content or event/activity play critical role (O'Keefe & Linnenbrink-Garcia, 2014). It must be noted that both affect-related and value-related valences, in contrast to situational interest, depend directly upon to certain activity/event, domain, or object but not to the relationship between those and other environmental features (Eccles & Wigfield, 2002). Nonetheless, these two valences overlap somehow and are not absolutely distinguishable.

2.2.2. Consequences of Interest

The existence of relationship between interest and learning has been recognized by Herbart (1965a; 1965b) who was a German philosopher in 19th century. Schiefele summarized Herbart's opinion by stating "it is first and foremost interest that allows for correct and complete recognition of an object, leads to meaningful learning, promotes long-term storage knowledge and provides motivation for further learning" (1992, p.3). Then, Piaget (1981) has drawn attention to the importance of cognitive component of behavior as well as affective components by arguing that energizing role of affectivity plays an important role for intellectual functioning. According to Hidi (1990), Piaget used the term *energetic* in order to describe information processing system's affectivity dimension. She further argued that "one energetic feature of the organism-interest-is central in determining how we select and persist in processing certain types of information in preference others" (Hidi, 1990, p.549).

There has been a general agreement in the literature that being interested is a mental source that enhance learning and performance (Hidi, 1990; Harackiewicz & Hulleman, 2010) via heightening attention, concentration, recall as well as increasing mental effort (Ainley et al., 2002; Hidi, 1990; Hidi & Renninger, 2006; Krapp et. al., 1992; Pekrun, 2000). Interest has also been associated with cognitive functioning and persistence (Ford, 1992; Locke & Latham, 1990; Hidi, 1990; Hidi, 2000; Van Yperen, 2003).

Based on literature, one can argue that interest plays a major role for better learning and improved performance. As it was mentioned earlier, distinction may be made

among the types of interest. Yet, the most desired interest that the students should possess may be an individual interest. Because, a situational interest emerges in return for features of the situation that students in it. Therefore, interest of this type is shaped through the cues in the environment (Durik & Harackiewicz, 2007; Hidi & Harackiewicz, 2000; Mitchell, 1993). Even though cues in the environment grab students' attention at the moment, according to (Durik & Harackiewicz, 2007), they are bounded by the environment. On the contrary, individual interest is more durable disposition so that it response positively to stimuli even if the situation is altered (Durik & Harackiewicz, 2007; Renninger, 2000; Schiefele, 1991).

When people enter in learning or task situations with high level of individual interest such that they are eager to learn or complete a task, their approaches toward learning as well as experiences toward tasks are differs in a positive way (Durik & Harackiewicz, 2007). This is an ideal situation, according to (Durik & Harackiewicz, 2007), for learning because they are carious and care about the content (Rheinberg, Vollmeyer, & Rollet, 2000; Schiefele, 2001). In contrast to people with high individual interest, people having low individual interest are unable to engage in learning activity since they undervalue the content being taught (Durik & Harackiewicz, 2007).

2.2.3. Empirical evidences for contribution of interest on learning outcomes and performance

Durik and Harackiewicz (2007) have conducted two experimental studies to test the effects of situational interest (first 2 phases of situational interest, which is referred to as catch) on attention and involvement with the learning task, which was mentally solving two-digit multiplication problems using four-step technique (see Barron & Harackiewicz, 2001). The results of their first study showed that, participants who entered the learning situation with low individual interest benefitted situational interest in order to develop interest toward learning task, hereby they became involved with the learning task (Durik & Harackiewicz, 2007). Moreover, the same study

assured that participants with high individual interest in math performed better on the task and became more competent at using four-step multiplication technique than the participants with low individual interest in math (Durik & Harackiewicz, 2007).

The second study of Durik and Harackiewicz (2007) was the replication (a kind of extended version) of their first study, in which more sophisticated situational interest features were used. The effects of situational interest features (for the last two phases which is called hold) on task interest were found similar with the findings of the first study (Durik & Harackiewicz, 2007). Surprisingly, the situational interest features, based on the second study findings, undermined the task interest of participants with high individual interest in math (Durik & Harackiewicz, 2007). This unexpected result is attributed to distracting effects of situational features by the researchers who argued that "one possibility is that the collative features were distracting for individuals with high IIM because they may have wanted to receive the learning material in the most straight-forward way possible, without being bothered by visual complexity inherent in the layout of the instructional materials" (Durik & Harackiewicz, 2007, p. 606).

Lee, Chao, and Chen (2011) conducted a causal-comparative study with an intent of using confirmatory factor analysis (CFA) and structural equation modeling (SEM) to uncover the relationships among interest in learning and learning outcomes along with some other variables such as learning hours. The findings of the study indicated that "interest in learning exerts a positive and significant effect on learning outcomes in Taiwanese colleges with a 0.46 standardized path coefficient" (Lee et al., 2011, p. 150).

Koller, Baumert, and Schnabel (2001), through their longitudinal research, investigated relationship between interest and academic achievement in math at the end of 7th grade, end of 10th grade, and lastly in the middle12th grade. Their structural equation modeling analysis basically revealed that there is a reciprocal relationship between interest and achievement in math. Students more interested in math

demonstrated higher performance in math and then, higher performance in math leaded individuals to become more interest in math (Koller, et al., 2001).

Trautwein, Ludtke, Nagy, Lenski, Niggli, and Schnyder (2015) systematically explored the interactive effects of interest and conscientiousness on academic effort through four experimental studies using various data sets from high school students. First three studies used latent variable approach whereas the fourth study used a diary approach. Moreover, third and fourth studies used multi-level modeling to contrast the domain specific interest (Trautwein et al., 2015). In the first study, they tested the effects of individual interest in three subjects (English, German, and Math) and conscientiousness on academic effort. The results of the first study indicated that both conscientiousness and individual interest significantly predicted academic effort in all three subjects: English, German, and Math (Trautwein et al., 2015). The second study was a replication of the first study with relatively large sample. The second study supported the findings of the first study by reveling the results of both conscientiousness and individual interest significantly and uniquely predicted academic effort yet, it did not yield interaction effect in English course (Trautwein et al., 2015). The third study indicated substantial association between domain-specific interest and academic effort whereas the fourth study, which examined academic effort from day to day, demonstrated fluctuation in academic effort due to situational variation in interest (Trautwein et al., 2015).

Kahu, Nelson, and Picton, (2017) investigated the antecedents and consequences of college students' interest over persistence and learning through qualitative study. Their research findings suggested that students' existing individual interest leads improved situational interest that may be counted as a reason for better learning via cognitive and behavioral engagements (Kahu et al., 2017).

2.3. Achievement Goal-Orientation

A goal is defined by Locke, Shaw, Saari and Latham (1981) as "what individual is trying to accomplish" and they argue that it has a similar meaning to purpose and

intent concepts (p. 126). According to goal-setting theory, goal is "a representation of an end or result that an individual aim to achieve" (Van Yperen, 2003, p. 1006). To achieve certain aims, people must behave with an intention. The intention is produced by an integrated pattern of beliefs, attributions, and effects, which are defined by a goal (Ames & Archer, 1988; Peer, 2007; McWhaw & Abrami, 2001) as goals are "internal representations of desired states, where states are broadly construed as outcomes, events, or processes" (Austin & Vancouver, 1996, p. 338). Therefore, goal-orientation requires to and results in different approaching, engaging, and responding to achievement-type activities (Ames, 1992; Peer, 2007; Pulkka & Niemivirta, 2015; Tuominen-Soini, Salmela-Aro, & Niemivirta, 2008).

The achievement goal orientation has emerged four decades ego with the pioneering studies of Dweck (1986), Ames (1984), Maehr (1984) and Nicholls (1984). Back then, achievement goals were commonly called as purpose of task engagement (see, Maehr, 1989). Pioneers of goal orientation theorists have defined two distinct types of achievement goals. They labeled two types of goals (i.e., Dweck, 1986, called them as performance-goals and learning goals as Nicholls, 1984, referred to as ego involvement goal and task involvement goals). Over time, these labels turned into mastery-goal versus performance-goal dichotomy (Ames & Archer, 1987; Elliot, 1999). In other word, achievement-related purpose goal has two major dimensions which are *mastery-goals* and *performance-goals* (Ames, 1992; Duda, 2001; Pintrich & Schrauben, 1992). Each goal, in achievement goal settings, is assumed to provide a distinct perceptual-cognitive framework (Elliot & McGregor, 2001) and, hence, leads to distinctive patterns for cognitive processing and outcome (Ames, 1992; Dweck, 1999; Urdan, 1997).

2.3.1. Types of Achievement Goals

Mastery-goals focus on learning challenge and curiosity (Mcwhaw & Abrami, 2001) and ultimately "development of competence through task mastery" (Elliot & McGregor, 2001, p.501). Therefore, mastery-goal orientation has also been called in

literature as learning or intrinsic goal-orientation. Some other terms such as ego incentive goal, learning goal, task-oriented goal have been commonly and interchangeably used in achievement-goal literature. While fulfilling any task, mastery-goal oriented students develop new skills and achieve self-improvement enabling them experience satisfaction (Peer, 2007). Hence, for those students with mastery-goal orientation toward any task, challenge in or interest toward task leads accomplishment (Mecce, Hoyle, & Blumenfeld, 1988). Mastery-goal oriented students also use some adaptive behavioral strategies including problem reanalysis, increased effort, strategy shift and task disengagement when they face with difficulty (Peer, 2007) and they feel competent if they mastered the task or relatively improved own performances (Hall, Hanna, Hanna, & Hall, 2015).

On the other hand, performance-goals focus on grades, rewards or approvals (Mcwhaw & Abrami, 2001) and ultimately leads to "demonstration of competence relative to others" (Elliot & McGregor, 2001, p.501). Because goal-orientation is associated with external means such as rewards, it has been called as extrinsic goal-orientation. This type of goal orientation is also referred to as ego-social orientation in the literature (Usoroh & Effiong, 2013; Somuncuoglu & Yildirim, 1999). Students who have performance-goals generally displays following characteristics: (1) abstain from challenging tasks to conceal their inability, (2) feel embarrassment or shame due to poor performance, and (3) concerned about being judged by others (Peer, 2007). These main characteristics shape their task selection, task disengagement (or persistence), and performance (Archer, 1994; Cury, Elliot, Sarrazin, Da Fonseca, & Rufo, 2002).

Achievement goals, as stated earlier, originally are classified in mastery and performance dichotomy even though labels were changed from one researcher to another (i.e., performance-goals vs learning goals or ego-incentive vs ego-involved) (see, Dweck, 1986; Nicholls, 1984; Peer, 2007; Usoroh & Effiong, 2013). Later on, Elliot and his colleagues has revised mastery-performance goal dichotomy so that approach-avoidance distinction added to the conceptualization of achievement-goals

(see Elliot, 1999; Elliot & Covington, 2001). Hence, Elliot and McGregor (2001) proposed revised achievement-goal conception aroused by combination of mastery-performance and approach-avoidance distinctions. Thus, their conceptualization of achievement-goals included four distinctive achievement-goals, which are combination of mastery-performance and approach-avoidance distinctions. This may be modeled as 2X2. The types of achievement-goals in their conceptualization are mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance. Approach goals focus on positive and desirable outcomes whereas avoidance goals aim to elude undesirable outcome (Van Yperen, 2003). According to Harackiewicz and Hulleman (2010) either mastery or performance-goals can be achieved one of two ways: "by trying to attain the desired outcome such as learning as much as possible (mastery-approach) and doing better than others (performance-approach), or trying to avoid negative outcomes such as not learning the material (mastery-avoidance) or doing worse than others (performance-avoidance)" (p.44).

In sum, there are two fundamental form of achievement-goals (mastery-performance dichotomy) and each can be subdivided based on the way they are achieved (approach-avoidance distinction). Mastery-goals concerned with attaining knowledge and mastering skills whereas performance-goals are concerned with normative excellence. These goals can be partitioned by approach-avoidance distinction, which is the way of achieving either intended goals. Yet, the current study will only cover mastery-approach and performance-approach achievement-goals they are the two types of propose goals which, according to Senko and Harackiewicz, "provide distinct benefit to educational outcomes" (2005, p.1740).

2.3.2. Consequences of Achievement Goal-Orientation

Studies relevant to achievement goals suggest that adopting mastery or performance-goals provide students with distinct perceptions of the classroom learning (Ames & Archer, 1988; Pulkka & Niemivirta, 2015) which, in turn, affects students' engagement in task, persistence (Dweck & Leggett, 1988), preference on challenging

task, use of learning strategies (Ames & Archer, 1988; Elliot & McGregor, 2001; Phan, 20009; Soltaninejad, 2015; Somuncuoglu & Yildirim, 1999).

Across a number of discreate studies in the achievement-goal domain, consistent pattern of findings suggest that students with mastery-goals tend to display positive attitude toward challenging task (Ames & Archer, 1988; Peer, 2007) and spend more time on learning task (Ames, 1992; Buttler, 1987; Elliott & Dweck, 1988). They also enhance the quality of engagement in learning (Ames, 1992) through use of effecttive learning strategies (i.e., cognitive, metacognitive and problem solving strategies) (Ames, 1992; Ames & Archer, 1988; Pintrich, 2000; Somuncuoglu & Yildirim, 1999; Usoroh, Akpan, & Effiong, 2015). Mastery-goal oriented students use various learning strategies because they believe that failure or success is depend on effort which can be optimized via change in strategy (Garner, 1990; Middleton & Midgely, 1997; Pintrich, 2000). Consequently, the qualities of mastery-goals result in conceptual understanding (Peer, 2007) rather than rote learning leading promotion in performance as well as achievement and increase in competence (Baron & Harackiewicz, 2001; Hall et al., 2015; Mattern, 2005).

In contrast to mastery-goal orientation, performance-goal orientation relies on being succesfull by showing relatively higher outcome than others or just meeting the criteria by using little effort (Ames & Archer, 1988; Hall et al., 2015). Therefore, those with a performance-goal orientation count themselves as competent and successful as long as they perform well on any task relative to others. Because they have tendency to exert minimal effort, they prefer easier tasks and avoid challenge. Another facet of performance-goal is avoiding failure. Therefore, students with performance-goal orientation may avoid the task in order to refrain theselves from looking stupid (Pintrich, 2000). Consistent finding among the effetcs of performance-goal orientation (either approach or avoidance) are decreas in persistence, demostrated low task engagement (Acher, 1994; Meece & Holt, 1993) and used less self-regulation in cognitive tasks (Pintrich, 2000; Takashiro, 2016). Performance oriented goals also

encourage learners to apply surface cognitive strategy use rather than deep cognitive strategies (Soltaninejad, 2015; Somuncuoglu & Yildirim, 1999; Takashiro, 2016)

The reviwed works regarding achievement-goal orientation provides general insight that mastery-goal oriented learners are aware of the association between effort and accomplishment. Thus, while working on learning tasks, they intentionally exert more cognitive effort, use learning strategies, push the limits of self-control to persist on task. In contrast, performance-goal oriented learners tend to avoid challenging task and to meet the task requirements withminimum effort. Therefore, we may misguide the readers if we strictly argue that one type of goal is superior to another.

2.3.3. Empirical evidences for effects of achievement goal-orientation on learning outcomes and performance

In their study, (Hall et al., 2015) investigated the associations between pharmacy students' goal orientation dispositions and their academic performance along with some other variables such as gender and grade. They used multiple statistical techniques including parametric tests, nonparametric tests, and linear regression to ascertain the associations and their significance. The results other than the association between goal orientation and academic performance are not reported here due to their irrelevance. The findings revealed that none of the four discrete goal orientations (i.e., mastery-approach, performance-approach, mastery-avoidance, and performance-avoidance) made significant impact on academic performance, which was predicted by participants' general grade point average (Hall et al., 2015). In addition, among the four discrete goal orientations, only mastery-avoidance goal significantly predicted the academic performance where reported coefficient was -.35, which implies that mastery-avoidance goal has a negative impact on academic performance (Hall et al., 2015).

Another study concerned with the outcomes of achievement goal orientations conducted by Pantziara and Philippou (2015). Their intention was investigating the association between achievement goal orientation and 6th graders' achievement and

motivation toward mathematics. By taking four discrete achievement goal orientations (i.e., mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance) as independent variables, they conducted two similar studies to see consistency between the results of the two studies.

The results of their first study showed that there was a significant achievement score mean difference among the groups defined by the goal orientation type (Pantziara & Philippou, 2015). Therefore, they run the Tukey HSD as a Post-hoc comparison test that assured significant difference between the students with high-mastery andlow performance-goal orientation and students with high-performance and low mastery-goal orientations (Pantziara & Philippou, 2015). The researhers also reported that the student group with high-mastery and low performance-goal orientation had the highest achievement mean score among all groups. The results of their second study also revealed statistically significant difference among the four groups preciously defined in the first study. Then, Post-hoc comparison test demonstrated significant difference between the very same groups (high-mastery and low-performance vs low-mastery and high performance) (Pantziara & Philippou, 2015).

Mattern (2005) conducted an experimental research to determine the effects of achievement goal orientations on performance of undergraduate students. The aim of her study was to see whether multiple goal orientations improve performance more than a single goal orientation (either mastery or performance) does. Her experimental research took place in Human Development course and students' end of term grades were used as indicator of their performance.

One way analysis of varience resulted in statistically significant main effect for achievement goal orientation groups defined by two distinct goal types (i.e., high-performance and high-masteryhigh-performance and low-mastery, low-performance and high-mastery, and low-performance and low-mastery) (Mattern, 2005). Then, the Tukey Post-hoc test was conducted. According to the Post-hoc test results, there was no statistical significant difference in the course grade means ofany two groups

(Mattern, 2005). In other words, having both mastery and performance-goal makes no further improvement on the performance than having a single achievement goal (either mastery or performance). As a matter of fact, the students with highest performance mean had only mastery-goal and the students with lowest performance mean had only performance-goal as suggested by the findings of the reseach (Mattern, 2005).

A similar study regarding the role of multiple achievement goals on 8th and 9th graders' performance and motivations conducted by Pintrich (2000). In his study, he also investigated the impact of achievement goals on use of learning strategies and gathered data over three waves from math classroom. He used actual grades of students in math as an indicator for their performance as well. The analyses of data signified that, in each and every wave, those students with high mastery-goal orientation used more cognitive strategies than performance-goal oriented learners (Pintrich, 2000). Another finding of the study was the increase in use of self-regulation of their cognition in only high mastery-goal oriented group over time (Pintrich, 2000). The last relevant finding of this study was that even if there was a slight imporevement ingoal oriented groups' grades, there was no signiticant difference on grades over time in neither groups defined by the type of goal orientation (Pintrich, 2000).

The aim of the study that Usoroh and Effiong (2013) conducted was to ascertain the relationship between achievement goal orientation (i.e., mastery-goal, performance-goal) and the performance of undergraduate studens in Home Economics. To use as performance indicator, they administered home economics performance test for this correlational study. Usoroh and Effiong (2013) used Pearson Product Moment Correlation to analyse the data amd make inferences. The study revealed that both mastery and performance-goals significantly and positively correlated with academic performance (Usoroh & Effiong, 2013). In other words, the higher the mastery and/or performance-goal the higher the academic performance. Another notewhorthy study in the achievement goal orientation area is the study of Somuncuoglu and Yildirim (1999). In their study, they aimed to determine the association, if there is any, between achievement goal orientation of undergraduate students and their use of learning

strategies through correlational analysis (Somuncuoglu & Yildirim, 1999). The results of the correlation analysis indicated that, there was a low (r = -0.24) significant correlation between use of surface cognitive strategies and mastery-goal orientation whereas use of surface cognititive strategies highly and positively correlated (r = 0.40) with performance-goal orientation (Somuncuoglu & Yildirim, 1999). Study aldo yielded that mastery-goal oerientation had a high positive correlation with metacognitive strategies as well as use of deep cognitive strategies (r = 0.53 and r = 0.63, respectively) while there was no correlation between the use of deep cognitive strategies and performance-goal orientation (Somuncuoglu & Yildirim, 1999).

2.4. Cognitive Effort

Cognitive effort has arisen out as a theoretical construct in cognitive psychology (Kahneman, 1973; Navon & Gopher, 1979; Thomas, 1983) and later then, it's influential characteristics on human performance was recognized (Bacic, 2014). Expending cognitive effort provide students with numerous outcomes. Because conscientiousness and intellectual engagement along with intelligence determines the degree of achievement (Westbrook & Braver, 2015). Conscientiousness and intellectual engagement pertain to cognitive effort (von Stumm, Hell, & Chamoro-Premuzic, 2011). Degree of cognitive effort exertion, according to literature, predicts academic achievements, grades, performance on math, memory, problem solving, cognitive and metacognitive processes, reasoning, and decision making (Cacioppo, Petty, Feinstein, & Jarvis, 1996; Shah & Oppenheimer, 2008; Pyne, Bettman, & Johnson, 1988; Smith & Walker, 1993; Verplanken, Hazenberg, & Palenewen, 1992; Westbrook & Braver, 2015).

In cognitive psychology as well as human performance literature, cognitive effort has highly been associated and even confused with other constructs such as motivation (i.e., Atkinson, 1957, equated cognitive effort with motivation), performance (i.e., Logan, 1960, assumed cognitive effort as disincentive factor to response), capacity and attention (i.e., Kahneman, 1973, equated cognitive effort with cognitive capacity

as well as attention). Yet, to be consistent with the epistemological purpose, cognitive effort may carry explanatory weight with corresponding constructs. Coarsely, effort must refer to an engagement degree in demanding task and higher engagement with learning task should enhance performance through attention (Westbrook & Braver, 2015). It must be noted that, even if cognitive effort is closely coupled with both motivation and difficulty, they all are distinctive constructs. Motivation is not identical with cognitive effort, indeed, increased effort may mediate motivation on performance (Westbrook & Braver, 2015). Distinction between cognitive effort and task difficulty relies on the lines drawn between requirements of tasks which are either resource-limited or data-limited (Norman & Bobrow, 1975). Performance can be improved via allocation of more cognitive resource if the task is resource-limited, on the contrary, additional cognitive resource would do no good to performance if the task is constrained by data quality (Westbrook & Braver, 2015).

According to the large body of research within cognitive psychology, cognitive effort has been equated to available cognitive resources, working memory capacity, and attention (Cooper-Martin, 1994; Kahneman, 1973; Olive, Olive, & Kellogg, 2002; Olive & Barbier, 2017; Piolat, Kellogg, & Farioli, 2001; Piolat, Olive, & Kellogg, 2005; Tyler, Hertel, McCallum, & Ellis, 1979; Vieira, 2016). Kahneman defines cognitive effort as an available cognitive capacity during a task in which person is engaged (1973). Supportingly, (Tyler et al., 1979) defined cognitive effort as an "amount of available processing capacity of the limited-capacity central processor utilised in performing an information-processing task" (p. 608). Thus, they relate cognitive effort with the working memory. Their definition of cognitive effort, according to Rendell (2010), emphesized the limited nature of attention and cognitive demanding nature of short-term memory. Additionally, Gathercole (1999), supported this working memory view of (Tyler et al., 1979) as arguing that processing a large amount of information requires great effort which is attention demanding. On the other hand, paying attention to a task, according to Kahneman (1973), can be considered same as allocation of mental resources (i.e., memory, judgement, and cognitive

resources of perception). Lastly, capacity or resource limited function of central processing links cognitive effort with cognitive/self-control. Because, effortful tasks require nonautomatic (controlled) responses produced by working memory which its resources are limited so does its processing capacity (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister & Vonasch, 2014; Hasher & Zack, 1979; Schneider & Shiffrin, 1977; Mulder, 1986; Muraven, 2012).

Grounding on the perspectives of cognitive effort views in cognitive psychology, we can summarize that, (1) processing large amount of information (i.e., working on task such as writing a composition, solving a math problem, et cetera) requires cognitive effort, (2) cognitive effort is the resource that central processor utilized during a task, (3) these resources are limited so does the capacity of working memory, (4) in order central processor to allocate more cognitive resources to intended behavior (i.e., activity, thought, task etc.) attention and self-control (cognitive control) are needed. Therefore, it might be argued that the amounts of both attention and self-control provide insights regarding the amount of cognitive effort exerted during a task. Nonetheless, it would be wise to consider attention, self-control, and working memory concepts in detail to fully understand the associations among all.

2.4.1. Theories of Attention

The key concepts in attention are concentration, selection, and focalization of consciousness. Definition of the term attention varies and each definition stems from one relevant theory of attention (i.e., Attenuation theory, Filter theory, Capacity theory). Mostly encountered definitions for attention in literature are concerned with, selectivity of attention, state of alertness, and finite capacity. Selectivity of attention implies to a cognitive process of concentrating on some information (relevant information) while ignoring the rest of the environment (unwanted information) and state of alertness views concerned with readiness for action (Deepasri & Claudine, 2014; Rendell, 2010). The last view of attention is the most relevant to cognitive effort. Therefore, the following definition will be discussed in details.

Attention refers to “the mental process of concentrating effort on a stimulus or mental event: the limited mental energy or resource that powers the mental system” (Deepasri & Claudine, 2014, p.167). This definition has two facets: control of attention and limited processing resources. Control of attention enables people to choose relevant information from the environment and block out the rest in order to behave efficiently because cognitive effort associated with information processing (McDowd, 2007). A classic example for attention control is the cocktail effect—i.e., being able to listen only one person and ignore other conversations in a room with full of people (Deepasri & Claudine, 2014). In other facet, attention can also be seen as the amount of allocated resources for processing certain information among whole resources which are limited (Deepasri & Claudine, 2014; Kahneman, 1973; McDowd, 2007; Rendell, 2010; Styles, 2000).

The nature of limited capacity of attention may be explained by the theory of general capacity of attention. According to general capacity theory, attention has general and flexible capacity and this capacity might be allocated among tasks unless the sum of attentional demand of multiple tasks does not exceed the total limit (Abernethy, 1993; Kahneman, 1973). The general capacity theory also suggests that, if a task demands higher cognitive effort which leads increased level of attention, smaller amount of capacity would remain for subsequent tasks (Abernethy, 1988). In other words, more attention yields more cognitive effort allocation among the sum, therefore leaves an individual with less cognitive resource to perform subsequent task. Therefore, performance in subsequent tasks would become relatively low.

What information to process may depend upon the achievement goal and interest of an individual since the individual controls the allocation of attention (McDowd, 2007). It must be noted here that multiple information coming from multiple source can be processed and requires various levels of cognitive effort aligned with allocation of attention. Yet, the information receives no attention may not be performed. In similar vein, the task that requires more cognitive resources than readily available suffers (McDowd, 2007). If, as it was argued, cognitive effort relies on working memory

capacity along with allocated attention, concept of working memory worth mentioning.

2.4.2. Working Memory

Working memory is a cognitive system in which the information retrieved from either environment or long-term memory is stored temporarily and processed (Galbraith, Ford, Walker, & Ford, 2005; McCutchen, 1996). Working memory system is composed of one core system which is called central executive, and two slave systems: the phonological loop, and a visuospatial sketchpad (Galbraith et al., 2005; Silva, Faisca, Ingvar, Petersson, & Reis, 2012; Vanderberg & Lee Swanson, 2007). They called slave system due to the supervisory role of central executive component. Besides supervising a whole system, central executive also responsible for control of attention, the retrieval of representations from long-term memory, and simultaneously storing and processing information (Baddeley, 1996; Galbraith et al., 2005; Silva et al., 2012).

The core component of working memory, central executive, is supported by subsidiary systems (slave components) while processing information. The first slave system: the phonological loop has a phonological short-term store that temporarily keep phonologically coded information (Silva et al., 2012). Phonological loop is responsible for recoding nonphonological inputs into phonological codes through subvocal rehearsal processing thus, it enables nonphonological inputs to be stored into phonological short-term storage for later use (Baddeley, 1996; Rendell, 2010; Silva et al., 2012). By contrast, the other slave component is responsible for storing visuospatial materials (i.e., visual information, spatial information, kinesthetic information) into distinctive storages in accordance with visuospatial features of material (Andrade, 2001; Rendell, 2010; Silva et al., 2012; Vanderberg & Lee Swanson, 2007). In short, the phonological loop manipulates and maintains the verbal memory traces while visuospatial sketchpad does the same for visual pattern and

spatial movements (Baddeley, 2003; Silva et al., 2012; Vanderberg & Lee Swanson, 2007).

The process of working memory and role of each component that constitutes dynamic working memory system is briefly discussed above. The intention of this brief discussion is to make clear and imaginable the complex nature of processing information within the working memory system. It also gives ideas about the demands of the information processing as well as the assumption on multiple tasks' competition for limited cognitive resources such as attention and cognitive control. One should not forget that due to cognitive resource limitation of information processing system, there always be a trade-off among cognitive tasks. These trade-offs might be understood better if dual-task theory taken into account.

2.4.3. Self-Control

People are tend to attain their achievement goals via underlined self-controlled behavior (Bergen, 2011; Bertrams & Dickhäuser, 2012). In this respect, self-control becomes a key factor for success in life (Baumeister, Leith, Muruven, & Bratslavsky, 1998). Because, life is shaped through behaviors (especially with the controlled ones) and behaviors are modified by the self-control which is regulated by goals. For example, senior high school student who studies long hours for days with the hope of admitting a college prioritizes a distal goal over temporary comforts. In this regard, to reject tempted short-term satisfactions for the sake of better distal goals necessitate great deal of self-control. Yet, choosing the option that will provide more benefit in the long-term can be an indicator of successful implementation of self-control, similarly, going for a proximal temptation may imply for self-control failure (Milyavskaya & Inzlicht, 2017).

Self-control refers to the process of deliberately suppressing, overriding, or altering one's own responses (i.e., impulses, thoughts, emotional reactions, actions) in order to meet the standards or desired goals (Baumeister, Vohs, & Tice, 2007; Bergen, 2011; Inzlicht, Schmeichel, & Macrae, 2014; Lindner, Nagy, Arhuis, & Retelsdorf, 2017;

Milyavskaya & Inzlicht, 2017; Tangney, Baumeister, Boone, 2004). As the definition implies, there is a family of behaviors corresponding with self-control, so that, one should not try to single out one specific cognitive process as self-controlled. Yet, even a little resemblance among these family of behaviors can be expected (Kable, 2013).

Self-control yields important outcomes such as directing attention toward relevant information (Hagger, Wood, Stiff, & Chatzisarantis, 2010; Schmeichel, Vohs, & Baumeister, 2003), shielding irrelevant information (Hofmann, Schmeichel, & Baddeley, 2012), academic performance (Bertrams & Dickhäuser, 2012; Duckworth & Seligman, 2005). However, successful self-control requires achievement goals, self-control strength (inner resource), and motivation (Baumeister & Vohs, 2007; Baumeister & Vonasch, 2014). Various studies made it clear that self-control is associated with the amount available limited resource akin to strength or energy (Baumeister et al., 1998; Baumeister et al., 2007; Fleming, 2014; Muraven, Shmueli, & Burkley, 2006; Stucke & Baumeister, 2006). The association between limited resource and self-control is explained by the strength model of self-control (ego depletion).

In general, the self-control model postulates that there is a finite and domain-independent inner (or mental) resource that is vital for working memory to process. When an individual behaves in a controlled way such as solving a math problem working memory uses self-control resource which is limited. This process depletes the self-control resource. Moreover, the greater working memory processes the greater the self-control resource depletion. There would be a consequence for depletion of resource which is downfall in subsequent performance as well as task disengagement.

Additionally, Intertemporal choices are also tied up with the association between self-control and limited mental resource (Kable, 2013). It means that when a person deals with more than one task simultaneously, he or she must allocate self-control resources as well as attention (in broader respect, the limited central processor capacity) among the task in accordance with the achievement goals. It is worth mentioning that,

Schmeichel, Vohs, and Baumeister (2003) extended the limited energy model and they assured that cognitive processing (i.e., text comprehension, problem solving, reasoning, decision making, comparison) depends upon the very same resources that self-control does.

2.4.4. Replenishment of Depleted Cognitive Resource

As limited resource theory suggests, depletion in self-control is temporary. It replenishes over time. Otherwise, there would not be possible to perform subsequent behaviors which require self-control. There is no single path for replenishment of self-control resources, which has various labels such as limited inner resource, cognitive resource, or mental resource. Yet, the most mentioned and the most reasonable ways of replenishment of self-control resource are sleep, resting (or relaxation) and positive effect.

Individuals who are sleepless and fatigue tend to have worse self-control than well rested fresh ones (Barber, Munz, Bagsby, & Powell, 2010; Muraven, 2012; Tyler & Burns, 2008). Sleep seems to compensate depleted sources, so that remove the negative effect of previous self-controlled responses on subsequent responses. There are various study results supporting the idea that sleep restores self-control resources. For instance, Muraven, Collins, Shiffman, and Paty (2005) experimentally tested the effect of sleep on self-control strength, and they argued that sleep restores self-control resources. Parrott, Garnham, Wesnes, and Pincock (1996) reported that individual who trying to quit smoking shows greater self-control when they sleep well. The findings of those studies indicate sleep is an effective way of depleted self-control resources (Muraven & Baumeister, 2000).

Another effective way for replenishment of depleted self-control resource is relaxation. As it cited in Schmeichel and Baumeister (2004), in his unpublished dissertation, Smith (2002) argued that mediation helps to remove negative effects associated with self-control resource depletion. Hence, is sufficient period of relaxation is allowed between two self-control demanding tasks, it might improve the

performance of depleted person on the second task due to replenishment effect of relaxation (Tyler & Burns, 2008). Relaxation is independent from arousal in order to be effective in replenishment.

Another distinctive way of restoring depleted self-control resources is positive affect (Tice, Baumeister, Shmueli, & Muraven, 2007). Tice and her colleagues investigated replenishing effects of positive mood or emotion after resource depletion. They used different methodologies in their four studies, yet findings of all four suggested that positive emotion helps to restore depleted resource needed for self-control (2007). Bergen argued that due to replenishment effect, participants with positive emotions might be able to persist longer on subsequent self-control demanding task than those participants whom not received any positive mood or emotion between former and latter tasks (2011).

2.4.5. The Strength Model of Self-Control

Based on a cognitive control perspective, three overlapping mechanism (i.e., goals, task monitoring, and operating processes) are associated with self-control strength (Bergen, 2011; Carver & Schenier, 1982; Robinson, Schmeichel, & Inzlicht, 2010). Goal is desired state, mismatch between desired state and actual state is detected through monitoring, and then operating process makes adjustments in order to reduce mismatches (Bergen, 2011; Dang, 2018). In order to conceptualize the operation mechanism through limited resource perspective, strength model is initialized (Baumeister & Heatherton, 1996; Bergen, 2011; Dang, 2018). In another word, strength model of self-control conceptualizes that self-controlled response require inner strength resource which is finite.

The core idea behind suggested model is that self-control operates as muscles do (Dang, 2018). The analogy between muscles and self-control relies on the findings of early studies which suggest that deterioration of self-controlled responses over time resembles muscles getting tired (Baumeister et al., 2007). Exerting self-control in one response (i.e., impulses, thoughts, emotional reactions, actions) leaves less self-

control available for other responses (Baumeister et al., 1998; Baumeister et al., 2007; Muraven et al., 2006; Muraven & Slessareva, 2003). Muraven et al., noted that depletion in self-control resource has a temporary effect and it should raise back to its previous level via sufficient rest and sleep (1998).

To comprehend better, the assumptions underlying strength model should be taken into consideration. Strength model of self-control comprises the following assumptions:

> *"First, acts of self-control require a resource or strength. Second, this resource or strength is limited. Third, all kinds of self-control acts draw on the same resource. Fourth, exertion of self-control expends the resource. Fifth, the success of self-control depends on the available level of resource." (Dang, 2018, p. 20).*

What differs strength model from the rest of the limited capacity models is that self-control resource exertion cause fatigue (Muraven et al., 1998). Early compelling evidences of strength model as well as limited resource of self-control were reported by Baumeister and his colleagues (1998) after they conducted series of experimental studies. In study 1, they tried to regulate one's emotional response toward an upsetting movie. The findings of this study assured that self-control acts like a strength because altering one's emotional state caused decline in physical stamina measured by squeezing a handgrip (Muraven et al., 1998).

Study 2 was a replication of study 1 with using slightly different method and experiment procedure. They asked participants to suppress a thought rather than altering emotional response. Persistence on unsolvable anagram was measured and used as dependent variable. The findings of this study supported the view that self-control resource is limited. The group who was trying to suppress a thought before anagram task persist less on the task than the control group (Muraven et al., 1998). Moreover, their study 3 was also a replication of study 2. They use the same manipulation (i.e., suppressing thought) but changed the task. They measured their

capabilities of controlling amusement toward humorous video. The result was also similar. The group with suppressing thought demonstrated poorer self-control than control group (Muraven et al., 1998).

The results of all studies conducted by Baumeister and his colleagues (1998) were consistent with each other. It also provides evidence that there is a resemblance between self-control resource depletion and muscles getting tired (or fatigue). The study investigating the effect of self-control resource depletion on muscle-endurance performance confirmed the resemblance. That study was conducted by Bray, Ginis, and Woodgate (2011) and tested the hypothesis that participants who had been exposed to self-control resource depletion task would perform more poorly in a subsequent muscle-endurance task (i.e., isometric handgrip squeezing) than the participants in control group do. The study confirmed the view of strength models because the result of the study failed to reject the researchers' hypothesis (see Bray et al., 2011).

2.4.6. Dual Task Paradigm

Cognitive effort has been attributed to the fraction of working memory capacity as well as attentional resources which are partitioned among mental processes running simultaneously (Piolat et al., 2005; Tyler et al., 1979). Dual-task is one of the best-known experimental methods for measuring cognitive effort while an individual engaged in cognitive tasks such as text production, post-editing, comprehension, and anagram solving. In this method requires participants to perform two distinct tasks simultaneously. These tasks were commonly called as primary and secondary tasks (Olive, 2004). In most cases, the primary task is the main task where the researcher aims to measure cognitive effort that participant exerted. The secondary task, on the other hand, should be measurable and attention demanding. Thus, in lots of studies, reaction time to an auditory probe has been used as the secondary task (see, Olive, 2004; Olive & Barbier, 2017; Olive, Kellogg, & Piolat, 2001; Piolat et al., 2005; Piolat, Olive, Roussey, Thunin, & Ziegler, 1999). For instance, while working on the

primary task such as post-editing, participants are asked to react to an auditory probe as fast as possible by clicking an assigned mouse button.

This dual-task technique relies on the assumption of limited attentional resource pool of cognitive system where the working memory allocates its capacity among simultaneously processed tasks (Jaroslawska, Gathercole, & Holmes, 2017; Olive, 2004). Due to cognitive resource allocation, performance of the secondary task is interfered with the primary task. As the cognitive resource demand of the primary task increases, performance in the secondary task decreases (Olive, Alves, & Castro, 2009). More specifically, the greater cognitive effort in the primary task (i.e., producing a text, making puzzle, editing text, solving math problem, note taking), the greater the secondary task performance degradation (Olive et al., 2001; Olive et al., 2009). If the secondary task is to react an auditory probe by clicking a mouse button, exerting more cognitive effort in the primary task results in longer reaction time to the auditory probe (i.e., Piolat et al., 2005).

2.5. Closely Related Studies

Optimizing performance as well as self-control resources through individual interest is a fundamental property of this study. In their impressing work, O'Keefe and Linnenbrink-Garcia (2014) aimed to discover whether interest functions to optimize self-regulatory resources and performance. More specifically, they examined the interaction of value-related and affect-related valences of interest and their combinatory contributions on optimization of both performance and self-regulatory resources. They achieved this goal through two experimental studies.

O'Keefe and Linnenbrink-Garcia (2014) designed their first study to observe whether possession of high affect- and high value-related valences results in relatively higher performance. They conducted the first study with 153 undergraduate students. Experimental manipulation was applied in order to create value-related interest whereas self-reports were employed for affect-related interest (O'Keefe & Linnenbrink-Garcia, 2014). They reported that entire experimental session was

administered in a computer laboratory and the Word Prospector task was been assigned to participants. The participants were provided with five word prospector problems (PETROGLYPH, GORGANZOLA, GARGANTUAN, CUMMERBUND, TROGLODYTE) and asked to write all possible 4 and 5 letter meaningful words in a textbook.

To test the null hypothesis that possession of high affect- and high value-related valences would not results in higher performance, two multiple regression analyses were conducted: one with covariate and one without covariate (O'Keefe & Linnenbrink-Garcia, 2014). The findings of the first study suggested that higher affect-related interest yielded higher performance in high task importance condition; however, when persistence used as covariate, "participants who were high in affect-related interest and perceived the task to be high in value-related interest did not perform well because they were motivated to work on it longer" (O'Keefe & Linnenbrink-Garcia, 2014, p.74).

The second study of O'Keefe and Linnenbrink-Garcia (2014) was a replication of the first study with the following changes in design: (1) value-related interest measured via self-report rather than experimentally manipulation; (2) task was replaced by a set of anagrams; (3) positive affect was measured and used as covariate. Participants of the second study were 88 undergraduate students. The finding of the second study evinced that high-level affect-related interest correlated with higher performance when value-related interest is also high and task duration was fixed to 5 minutes. Additionally, results of the second study revealed that "the presence of both high affect- and value-related interest was also associated with relatively more self-regulatory resources available for the subsequent handgrip task as compared to when value-related interest was low" (O'Keefe & Linnenbrink-Garcia, 2014, p.76). These findings in favor of rejection of the null hypothesis that presence of high affect- and value related interests does not change performance and self-regulatory cost.

In another study; Liem, Lau, and Nie (2008) investigated the relationship among self-efficacy, achievement goals, task value, learning strategies, peer relationship, persistence, and English achievement outcome. 1475 ninth grade Singaporean students participated in the study, and achievement outcome measured through achievement test whereas rest of the data gathered by self-report instruments (Liem et al., 2008). They hypothesized theoretical model displayed in Figure 2.2. below. Liem et al., (2008) tested how model-data fit using structural equation modeling (SEM).

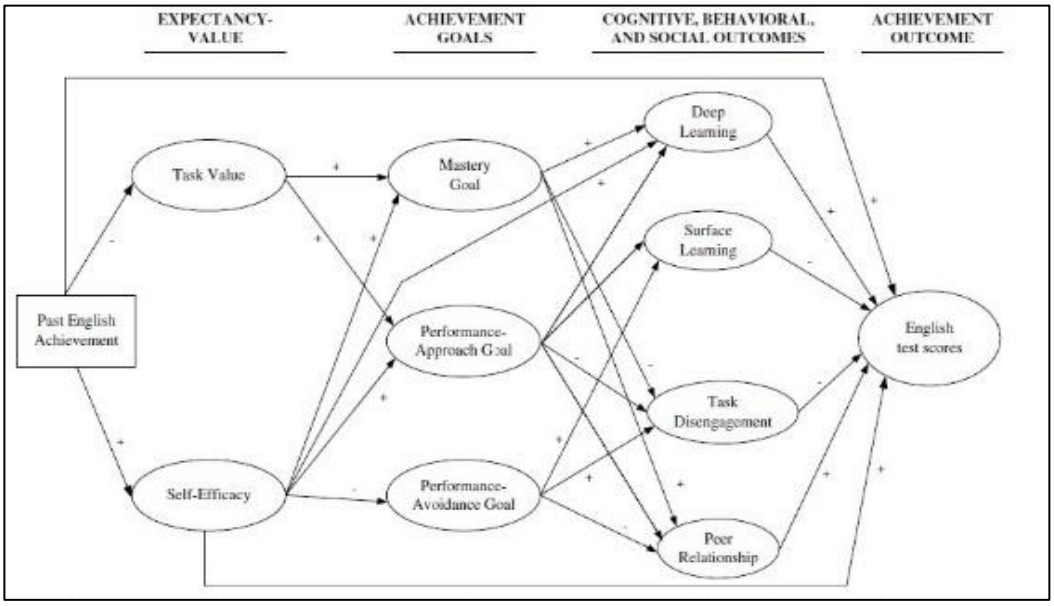

Figure 2.2. A theoretical model depicting the relations between task value, self-efficiency, achievement goals, cognitive, behavioral, social, and achievement outcomes.

Note: Retrieved from The role of self-efficacy, task value, and achievement goals in predicting learning strategies, task disengagement, peer relationship, and achievement outcome, by A. D. Liem, S. Lau, & Y. Nie, 2008, Contemporary Educational Psychology, 33(4), 486–512

According to Liem et al., (2008), their data supported their hypothesized model because data-model fit statistics were satisfactory and relationships among all variables depicted in the model, except the paths from self-efficacy to achievement outcome and from task value to the performance approach goal, were statistically significant. Thus, they concluded that "achievement goals partially mediated the relations between their task value and self-efficacy on one side, and the use of deep

and surface learning strategies, task behavioral disengagement, and peer relationship on the other" (Liem et al., 2008, p.504).

To examine the possible impacts of interestingness of a task on persistence, ordinary and worthy task performance and task satisfaction, Toker (2017) designed two posttest quasi-experimental studies. He worked with 146 undergraduate participants and presented them two distinct tasks: Dressing task and Computer Hardware task. Then, each participant was asked to express whether they found the task interesting. Because only 88 participants clearly stated whether dressing task was interesting (48 interested and 40 not interested), Study 1 (Dressing task) was carried on with these 88 participants. In the same way, 78 participants (41 interested and 37 not interested) included in Study 2 (Computer Hardware task) (Toker, 2017).

In the first study, participants asked to complete a task that requires combining suitable dress for three specific occasions: casual wear, special event, and working out. Toker (2017) measured the task completion time using screen capture software, the task performance through comprehensive rubric, job satisfaction using self-report job satisfaction scale, and worthy performance (WP) using the equation of WP = Performance/task completion time. To use as covariate, the researcher developed achievement tests: Dressing Achievement Test for the first study, and Computer Hardware Achievement Test for the second study.

MANCOVA results of the first study indicated that, in comparison to not interested participants, interested participants demonstrated longer persistence, higher performance, and higher satisfaction. Yet, the difference between persistence mean scores of interested and not interested groups was not statistically significant. The results of this study evinced that there was no statistically significant difference between the mean scores of interested and not interested groups, however, uninterested group's worthy performance mean score was significantly higher than interested group's worthy performance mean score.

In the second study, all measures except performance rubric and Computer Hardware Achievement Test were the same. The procedure of the second quasi experiment was similar to the first one. The results of the second study were somehow similar to the results of the first study. The interested group mean scores on persistence, satisfaction, and performance were higher than not-interested group mean scores on the same variables. This time, the difference between the performance mean scores of each group was not significant whereas WP mean score of the interested group significantly higher than the not interested group (Toker, 2017).

According to Toker, these studies demonstrated that "an interesting job is a good nonmonetary incentive for improving employees' persistence, job satisfaction, and job performance", therefore "an interesting job may complement monetary incentives and be an advantage when performance is considered by the total cost invested" (2007, p.367).

Barzegar (2012) investigated the causal relations between goal orientation and academic achievement taking self-regulated learning strategies as mediator variable. His model comprised three achievement goal types (mastery-approach goal, performance-approach goal, mastery-avoidance goal, and performance-avoidance goal), learning strategies (surface and deep cognitive strategies, resource management strategies, and metacognitive strategies) and academic achievement (2012). The hypothesized model of Barzegar (2012) is presented in Figure 2.3. below.

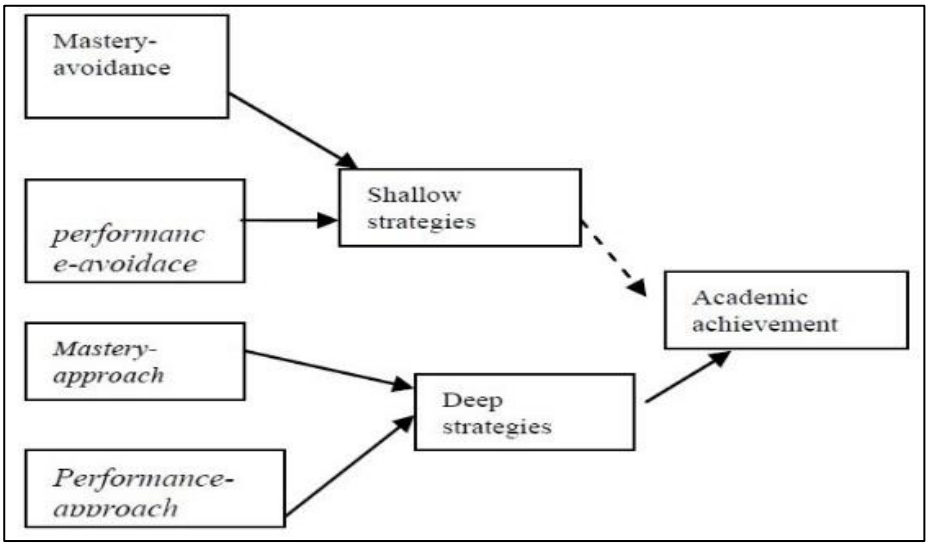

Figure 2.3. Proposed causal model for explaining achievement.

Note: Retrieved from "The mediation role of self-regulated learning strategies between goal and achievement-a path analysis" by M. Barzegar, 2012, In International Conference on Management, Humanity and Economics (ICMHE 2012) (pp. 112–115). Phuket (Thailand).

Barzegar (2012) tested his hypothesized model through multivariate regression and path analysis after collecting data from 260 psychology freshmen using Achievement Goal Questionnaire, The Motivated Strategies for Learning Questionnaire, and The Implicit Theories of Intelligence Subscale. The path analysis suggested that hypothesized model well-fitted to the data and able to explain 36% of total variance in academic achievement. The correlations among variables had been examined by Pearson product–moment correlations and reported in Barzegar (2012) as follows: Both mastery-approach and performance-approach goals were found to be negatively correlated with shallow learning strategies and positively correlated with deep strategies as well as academic achievement. Moreover, both mastery-avoidance and performance-avoidance goals were found to be positively correlated with shallow strategies and negatively correlated with deep learning strategies as well as academic achievement.

CHAPTER 3

METHODOLOGY

In this chapter, first, research design is presented. Second, design of *online critical information seeking and reporting* course in which the experiment took place is provided. Third, detailed information regarding the participants of the study is provided. Then, independent and dependent variables are clarified and measuring each variable is discussed in details. Further, experimental procedure is depicted. Lastly, analyzing data for hypotheses testing is provided.

3.1. Research Design

As it was stated earlier, the purpose of the study is to investigate the effects of individual interest and achievement goal-orientation on rote learning, meaningful learning, and worthy performance. We intended to achieve this investigation through designing a quasi-experimental design because, experimental design attempts to test causal hypotheses. As Fraenkel, Wallen, and Hyun (2012) argued, experimental research is the best way to establish and to examine causal relationships among variables.

In this study, achievement-goal orientation and individual interest is used as independent variables. Since there are two independent variables with multiple levels, the experiment design had to be factorial. According to Fraenkel et al., factorial design enables researcher to study independent variable with other variables, which are commonly called moderator variables to investigate the interaction effects on dependent variables. They also suggested that the moderator variables can be treatment variable as well as subject characteristic variables (2012). Since quasi-experimental research type looks like best fitted one to the purpose of this study, we decided to design the study as factorial quasi-experimental. Factorial design extends

the number of relationships investigated via experimental study and is the modification of post-test only true experimental design (Fraenkel et al., 2012).

In order to conduct the intended study, the participants needed to be distinctly grouped based upon their achievement-goal orientations and individual interest levels. Herewith, participants had been asked to fill out the interest and goal orientation questionnaires after they were fully informed about the topic that they would be covering during the experimental course. Based on the scores they had on the questionnaires, they were grouped as it was depicted in Table 3.1. below.

Table 3.1. Groups Defined by Independent Variables

ACHİEVEMENT-GOAL ORIENTATION	INTEREST LEVELS	
	High Interested	Low Interested
Mastery-Goal Oriented	Group MH	Group ML
Performance-Goal Oriented	Group PH	Group PL

The participants who did not fit into any group were dismissed from the study. Detailed information regarding an allocation of participants into groups is provided in procedure section.

3.2. Instructional Design Model: Layers of Necessity

The Layers of Necessity model argues that considering the necessities of a project along with time and available resources, instructional designers are responsible for choosing an adequate layer of design and activity development (Tessmer & Wedman, 1990). From this point of view, each layer is an instructional design model and these layers determine how much sophisticated the instructional design and development would be. The model is given in Figure 3.1. below.

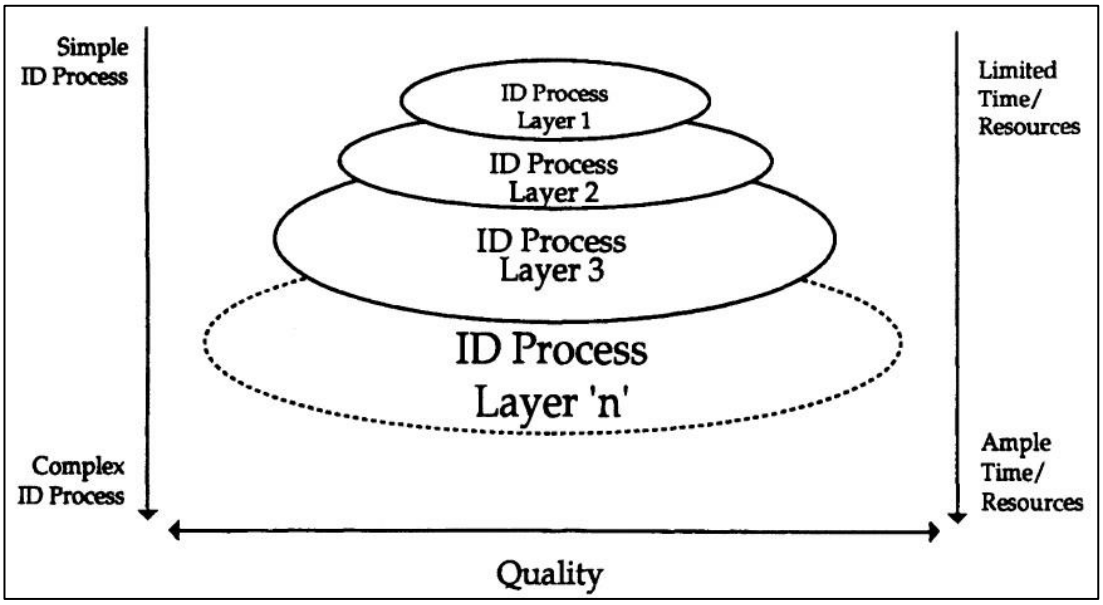

Figure 3.1. Layers-of-Necessity Model.

Note: Retrieved from A layers-of-necessity instructional development model, by M. Tessmer and J. F. Wedman, 1990, Educational Technology Research and Development, 38(2), 77–85.

As long as the time and the resource allowed, instructional designer moves to a higher layer, which results in presence of more complex instructional design processes and more quality instructional products. According to Tessmer and Wedman (1990), the following are critical differences between this model and the traditional model:

- Most instructional design models characterize design and development components as discrete and sequential. The output of each component serves as an input for the next component. However, the earlier component might be revised based on information gathered in subsequent component, the process is basically one way. In a layered approach, on the other hand, instructional design processes in each component can be broadened as the time and resource limits allow in the subsequent layer.
- Most instructional design models suggest stages or steps to be completed as the model dictates. A layered approach offers layer selection and layer implementation principles rather than strict procedures.

- In most instructional design models, each component is apart from others by its own identity whereas discrete components are not as much important as the layer itself.
- In most instructional design models, each component of the model must be sequentially accomplished while a layered approach allows components to be either minimized or completely deleted.
- Most instructional design models are time and resource intensive, whereas a layered approach is concerned with producing an efficient instruction.

Due to time and resource limitation, a layers-of-necessity model suggests that instructional design process might be limited to the following five components (Tessmer & Wedman, 1990):

- Situational assessment,
- Goal and Task Analysis,
- Instructional Strategy Development,
- Materials Development,
- Evaluation and Revision

3.2.1. Situational Assessment

A situational assessment was conducted with third-grade and fourthgrade preschool teacher candidates at Burdur Mehmet Akif Ersoy University during 2016-2017 spring semesters in order to gather information regarding their academic writing abilities. More specifically, this analysis identified knowledge and skill requirements related to the online information seeking, evaluation of information, synthesizing and reporting information in an academic manner. The situational analysis has conducted via careful review of existing project proposal materials, written homework, and content of project management course they had taken at undergraduate level. Additional information has been gathered from academic staff at the preschool teaching department regarding their students' skills in information literacy. Due to the fact that their instructors (especially with project management course teacher) can make inferences regarding students' information literacy skills and academic writing

abilities, gathering information from the instructors was necessary before moving into goal and task analysis section.

The situational assessment revealed that students demonstrate poor ability in writing project proposals and project reports. They have problems with locating adequate information. Another problem was the fact that students provide information found on the web without considering its accuracy. Mostly, they cited information from blogs, wikis, and even commercial Websites. A careful review of their existing works (e.g., homework, project report, literature reviews) highlighted that they do not know much about plagiarism so that they need to be taught how to avoid it. Their existing works are comprised of plagiarized materials indicating that they do not know how to avoid plagiarism. Moreover, their curriculum does not cover any content regarding information literacy and academic writing. The only courses contain materials regarding information literacy and academic writing is project management and scientific research methods courses. In these courses, the review and writing of literature are slightly mentioned.

The situational assessment identified that the students may need knowledge and skills on the following topics:

- Information literacy
- Basic concepts of Web
- Boolean operators and search engine filters
- Evaluation of information source
- Plagiarism, avoidance of plagiarism
- Ethical use of information provided by others: Quoting and Paraphrasing
- In-text citation & reference referring to APA Manual
- A general structure of the text

Through these contents, the students may demonstrate proficiency in online critical information seeking and academic writing.

3.2.2. Goal Analysis

Information gathered through the situational assessment was used to conduct an extensive goal analysis. Upon speaking with pre-school department staff as well as reviewing students' existing writings and course contents offered by the department, the following primary goals and objectives of the Online Information Seeking & Reporting course were determined:

1. To help students become more proficient on information literacy and communication technology,
2. To encourage students to respond critically to information found on the Web,
3. To encourage students to use information provided by others ethically,
4. To prepare students for writing concise academic text,
5. To develop academic writing skills.

Students' needs and corresponding goals and objectives are provided in Table 3.2.

Table 3.2. Needs, Instructional Goal, and Objectives

Needs	Goals	Objectives
Knowledge and skills for a proper way of seeking and locating adequate online sources of information	To help students become more proficient on information literacy and communication technology	Demonstrate knowledge on basic Web tools, search engines, and Boolean operators
		Demonstrate proper use of Boolean operators and search engine features to locate sources of information
		Use of online information seeking strategies such as determining and reviewing keywords
Knowledge and skills for evaluating the source of information critically	To encourage students to respond critically to information found on the Web	Evaluate the source of information toward following criteria: authority, relevance, reliability, objectivity, and currency
		Identify required information and its possible location within each material evaluate critically
		Critically review and summarize ideas
Knowledge and skills for ethical use of information provided by others	To encourage students to use information provided by others ethically	Cite reviewed and summarized ideas to support their own arguments

		Provide reference list for cited materials referring to APA manual
		Distinguish between quoted and paraphrased material
		Distinguish among types of information source (i.e., journal, book, magazine)
		Employ correct in-text citation and referencing referring to APA manual
		Demonstrate understanding on plagiarism
		Avoid plagiarism
Knowledge of writing structure and skills in academic writing	To prepare students for writing a concise academic text To develop academic writing skills	Support their arguments through citing existing works
		Demonstrate understanding of paragraph structure
		Apply the principles for writing concise sentences and paragraphs

Aligned with the goals and relying on the information gathered in the situational assessment, following course objectives were determined: By the end of the course, students will be able to;

1. demonstrate knowledge on basic Web tools, search engines, and Boolean operators,
2. demonstrate proper use of Boolean operators and search engine features to locate sources of information,
3. use of online information seeking strategies such as determining and reviewing keywords,
4. evaluate the source of information toward following criteria: authority, relevance, reliability, objectivity, and currency,
5. identify the required information and its possible location within each material evaluate critically,
6. critically review and summarize ideas,
7. cite reviewed and summarized ideas to support their own arguments,
8. provide a reference list for cited materials referring to APA manual,

9. distinguish between quoted and paraphrased material,
10. distinguish among types of information source (i.e., journal, book, magazine),
11. employ correct in-text citation and referencing referring to APA manual,
12. demonstrate understanding of plagiarism,
13. avoid plagiarism,
14. support their arguments through citing existing works,
15. demonstrate understanding on paragraph structure,
16. apply the principles for writing concise sentences and paragraphs.

3.2.3. Assessment Instruments

This course is designed in accordance with a top layer of a layered approach of instructional design due to time and resource limits. Yet, due to the main purposes of the study and designing this course, assessment instruments had to be developed. In this respect, two assessment instruments have been developed: Online Information Seeking & Reporting Achievement Test to assess rote learning outcomes and Performance Task to assess meaningful learning outcomes.

3.2.3.1. Achievement Test: Online Information Seeking and Reporting

To construct an achievement test for Web Search & Information Report, the following topics were outlined based on the aim and scope of the course:

- Information literacy
- Basic concepts of Web
- Boolean operators and search engine filters
- Evaluation of information source
- Plagiarism, avoidance of plagiarism
- Ethical use of information provided by others: Quoting and Paraphrasing
- In-text citation & reference referring to APA Manual
- A general structure of the text

Multiple choice norm-referenced test format was chosen to measure the extent of Web Search & Information report. The reason for choosing multiple choice test format relies on the advantages of objective scoring and a shorter time requirement.

To determine the extent of the test, the purpose of the test is considered which is measuring surface learning level. In this phase of test construction, table of the specification was needed. It was created under the consultation of two curriculum and instruction specialists. Based upon their recommendations, only two dimensions of Bloom's Revised Taxonomy (Remembering and Understanding) considered. The objectives of the test were aligned with the objectives of the course. The achievement test has covered whole content. Yet, distribution of items varied across subtopics based upon the importance of outcomes. Table of specifications and distribution of the weightage content in accordance with Bloom's Revised Taxonomy on cognitive domains and knowledge dimensions were provided in Table 3.3 and Table 3.4 respectively.

Table 3.3. Cognitive Domains

	Remembering		Understanding						
	Identifying	Retrieving	Interpreting	Exemplifying	Classifying	Summarizing	Inferring	Comparing	Explaining	Toplam
Basic web concepts		2			1				1	4
Boolean operators and filters	2	1		1			2			6
Evaluation of source of information		1		1	2					4
Information literacy	1	1	1		1					4
A general structure of the text		2		1			1			4
Ethical use of ınformation provided by others, Citeation, Referencing		4		3	2		1		2	12
Total	3	11	1	6	6		4		3	34

Table 3.4. Knowledge Dimensions

	Factual Knowledge	Conceptual Knowledge	Procedural Knowledge	Meta-cognitive Knowledge	Total
Basic Web Concepts	2	2			4
Boolean Operators and Filters	2	3	1		6
Evaluation of Source of Information		2	2		4
Information Literacy		2	2		4
General Structure of Text	1	3			4
Ethical use of information provided by others, Citation, and Referencing		6	5	1	12
Total	5	18	10	1	34

After careful preparation of the table of specifications, the researcher developed test items. The test items were written only in the form of multiple-choice. Thereby, the initial version of the achievement test with 34 items was developed. Several subject specialists, researchers, and language experts reviewed the initial version of the test. Within the bounds of experts' suggestions, proposed items were edited, revised and rewritten. All items had five options from which students were asked to choose the right answer.

This initial version of the test was piloted to two students to determine and to remove language difficulties encountered. Then, to examine the items' difficulty level and test reliability, the test was administered to 76 undergraduate students enrolled in Computer Education and Instructional Technology, Childhood Education, and Turkish Education departments in Faculty of Education at Burdur Mehmet Akif Ersoy University. Each correct response scored '1' and wrong attempted response scored '0'. These data were collected for item and reliability analyses.

3.2.3.1.1. Internal Consistency Estimates of Reliability

The achievement test was piloted to 76 undergraduate students currently enrolled in Turkish Education and Computer Education and Instructional Technology and Childhood Education departments at Burdur Mehmet Akif Ersoy University. Internal consistency estimates of reliability were conducted using IBM SPSS 22 software program. Based on Item-Total statistics, six items demonstrating weak or negative correlations were removed. Thus, 28 items left in the achievement test. KR-20 and Split-half methods were conducted for internal consistency computation. KR-20 yielded a coefficient of 0.78 while Gutman Split-Half coefficient turned out to be 0.82. Based on the results of these analyses, test reliability was acceptable.

3.2.3.1.2. Item Analysis

Item difficulties were ranged between 0.20 and 0.80 with a mean of 0.54. Most of the items were fell into moderate difficulty range. Discrimination indices of items varied between 0.21 and 0.89 with a mean of 0.48. The difficulty and discrimination indices of items are presented in Table 3.5. below.

Table 3.5. Achievement Test Item Difficulty and Discrimination Indexes

Item No	Difficulty Index	Discrimination index
1	.44	.36
2	.68	.26
4	.76	.47
5	.46	.78
6	.55	.63
7	.57	.73
8	.63	.78
9	.27	.42
11	.68	.57
12	.93	.16
14	.60	.26
15	.75	.31
16	.28	.31
17	.38	.47
19	.84	.26
20	.51	.89
21	.69	.31

22	.73	.47
24	.38	.42
25	.38	.78
26	.43	.77
27	.32	.21
28	.40	.52
29	.21	.47
30	.31	.63
31	.68	.16
32	.78	.58
34	.57	.42

Note: Items 3, 10, 13, 18, 23, and 33 were removed due to low item-total correlation coefficients.

3.2.3.1.3. Content Validity

Content validity assessment was processed as by Davis (1992) suggested. Nine subject-matter experts have reviewed the final version of an achievement test. Demographics of the expert group are given in Table 3.6. below.

Table 3.6. Experts' Demographics

Expert ID	Title	Department	Gender
Expert 1	Associate Professor	Science Education	Male
Expert 2	Assistant Professor	CEIT	Female
Expert 3	Assistant Professor	CEIT	Male
Expert 4	Assistant Professor	CEIT	Male
Expert 5	Research Assistant, PhD	Science Education	Male
Expert 6	Research Assistant, PhD	Science Education	Male
Expert 7	Research Assistant, PhD	CEIT	Male
Expert 8	Research Assistant, PhD Candidate	CEIT	Female
Expert 9	Research Assistant	Science Education	Male

They reviewed each item to evaluate for representativeness, comprehension, ambiguity, and clarity. The reviewers were asked to rate each item from A to D. The expert review form can be seen in the appendix. Once all subject-matter experts

returned their review form, all the forms were combined in a single form. This would enable the computation of content validity index presented in Table 3.7.

Table 3.7. Content Validity Indexes for Each Item

Number of Items	A. Item is adequate	B. Item needs minor revision	C. Item needs major revision	D. Item is inadequate	Content Validity Index
1	6	3			1
2	8	1			1
4	7	1			1
5	9				1
6	4	4	1		.89
7	8	1			1
8	8	1			1
9	9				1
11	7	2			1
12	9				1
14	8	1			1
15	9				1
16	9				1
17	8		1		.89
19	7	2			1
20	8	1			1
21	8	1			1
22	7	2			1
24	8	1			1
25	9				1
26	8	1			1
27	7	1	1		.89
28	9				1
29	7	2			1
30	8	1			1
31	9				1
32	9				1
34	9				1
Total					.98

To compute content validity index for each item, sum of the expert numbers who marked A (item is adequate) and B (item needs minor revision) divided by total expert number as suggested (Yurdugül, 2005). These index scores were compared to critic value of 0.80 suggested by Davis (1992) as it stated in Yurdugül (2005). According to these item-by-item comparisons, it can be argued that the achievement test developed by the researcher had content validity.

3.2.3.1.4. Face Validity

To make sure that the achievement test had a face validity, neither single item root nor its' options (alternative responses) were separated among different pages. They were grouped together as a single unit and intentionally left appropriate blanks between each and every item. Additionally, the alternative responses to each item root were similar in length. Also, test items along with their options were clear and understandable.

3.2.3.2. Performance Task: Online Information Seeking and Reporting

Performance-based assessment task was designed and developed to measure participants' meaningful learning levels on the contents offered through online information seeking and reporting course. This performance task also enabled us to gather data on meaningful learning outcome and ultimately test the null hypothesis that there is no significant difference among worthy performance mean scores among the groups defined by individual interest and achievement-goal orientation. Basically, the performance task has asked students to demonstrate their understanding and proficiency on the subject-matter by transferring their meaningful learning in a new context. While designing performance-based assessment task, the following steps were followed:

- The content and the skills were identified in accordance with the course objectives
- Initial task ideas were generated

- Peer discussion took place in order to choose among alternative performance task ideas
- The task was designed and developed
- The scoring rubric is developed
- Performance criteria for success was explicitly developed
- The performance task is reviewed and revised

3.2.4. Instructional Strategy

The course contents are planned such that it can be delivered within four weeks (i.e., four hours in-class activities along with assignments). In order to deliver all course content and learning materials in a timely manner, the course delivery approach needed not to be time-consuming. Course materials were offered via face-to-face and online instructions. Three discrete instructional strategies took place during in-class learning sections which are lecturing, demonstration and expository teaching. To disseminate essential information, the researcher gave lectures to a large group of students using PowerPoint presentations. Then, in computer labs, the researcher demonstrated skills using predetermined examples. Finally, expository teaching strategy has applied to enable teacher-student interactions and provide participants with practice, review, feedback, and correction opportunities.

The researcher provided students with more examples, shared video tutorials to re-demonstrate skills covered in class, and gave assignments through the Moodle course management system. The instructor continuously communicated with students through social media, more specifically Facebook groups which had been created for this intention.

The nature of the course content was cumulative. For example, in order to offer Boolean operators or search engines, basic Web concepts should have already been covered. Otherwise, students may encounter difficulties in comprehension. More importantly, required skills and skills to be developed should also follow a hierarchy from lower-level to higher-level. Therefore, after careful consideration and the expert

reviews, the contents of the course were sequenced as follows: Information literacy, basic Web concepts, Google search engines and filters, advanced search features, Boolean operators, evaluation criteria of information sources, structure of academic writing, plagiarism, avoiding plagiarism, citing referencing sources in accordance with American Psychological Association manual.

3.2.5. Instructional Material Development

Due to the purpose of this study, which is to determine the effects of individual interest and goal orientation on students' rote learning outcomes, meaningful learning outcomes' and worthy performances, materials used in this course kept simple. Otherwise, it would interfere with the independent variables used in the study. For example, developing multimedia materials (i.e., interesting or motivating videos, learning games, and animations) may alter students' situational interest levels, which interfere with individual interest levels of the students. In other words, situational interest or any other byproduct of advanced instructional strategy or instructional materials would act as a confounding variable resulting in a violation of internal validity of the study.

Course materials covered during in-class sections were mostly modified and summarized from existing texts related to the content. These contents offered to a large audience through lectures using PowerPoint presentations. The researcher developed these PowerPoint presentations to convey the essential information to the students. The information was divided into four modules in accordance with weekly covered topics. Modules have contained comprehensive examples, video tutorials for skill demonstrations, additional readings regarding, and individual assignments.

Students accessed to each module via Moodle after they had attended in face-to-face sections. The feedbacks regarding assignments were offered via either Moodle. The modules were organized in a cumulative order reflecting prerequisite knowledge and skills as well as the complexity of the materials. The modules were also designed in a self-contained manner to allow students to complete and retake them.

3.2.6. Evaluation and Revision

In coherence with the Layers of Necessity Model, modules were enhanced throughout the process as time and human resource allowed. Researcher consulted the instruction with subject matter experts (i.e., academic staff at Computer Education and Instructional Design department) and checked adequacy of the instructional strategy through one-to-one formative evaluation trials with one senior undergraduate student from CEIT department. Additionally, Online Information Seeking & Reporting Achievement Test has been piloted to 76 undergraduate students for the purpose of checking internal consistency estimates of reliability, and item analysis. Moreover, the test had been reviewed by a group of experts for content and face validities. Based on the results of these reviews and analyses, test revised and items were reduced from 34 to 28. Moreover, designed a performance task for the intention of measuring meaningful learning outcomes has been reviewed by the subject matter experts and piloted to one senior undergraduate student from CEIT department. Based on the expert reviews and pilot results, the researcher carried out the necessary modifications.

3.3. Participants

Participants included 187 undergraduate students at Burdur Mehmet Akif Ersoy University who were previously enrolled and successfully completed Computer-I, Computer-II and Project Management I courses. Participants' ages ranged from 18 to 28. Participants were recruited through Scientific Research Methods, and Project Management-II courses at Early Childhood Education Department. Due to all participants recruited from the Department of Early Childhood Education at Faculty of Education, 171 participants were female whereas 16 participants were male. Dispersion of participants based on grade level and day/evening education were displayed in Table 3.8. below.

Table 3.8. Dispersion of the Participants

Garde Level	Frequency	Percentage	Cumulative Percentage
2	12	6.4%	6.4%
3	95	50.8%	57.2%
4	80	42.8%	100%
Day/Evening			
Day	96	51.3%	51.3%
Evening	91	48.7%	100%

The participants were conveniently sampled among 230 undergraduate students who were enrolled the courses which are participants were recruited. All participants voluntarily participated in the study after they were informed about the study. They were also asked for written informed consent form, which can be seen in the appendix. After their agreement of participation, they were fully informed about the study and the course they will be being taken for at least 4 weeks. Once they were informed and reviewed the course outline their questions and concerns were responded by the researcher. Then, they were asked to fill out the goal orientation questionnaires which were allowed researchers to assign them to whether Mastery-Goal or Performance-Goal groups. Assignments of participants to mentioned groups were discussed at Grouping Participants section in details. One independent variable (Goal-Orientation) was manipulated in a laboratory experiment within 4 weeks of Critical Web Searching and Reporting course. During the experiment, 12 participants dropped out of the study.

3.4. Variables and Measures

As the purpose of research suggested, the effects of two independent variables on three dependent variables investigated in this study. The first independent variable is individual interest with two levels: high interest and low interest. The second independent variable is an achievement goal which has two factors: mastery-goal and performance-goal. Three dependent variables used in this study are rote learning outcomes, meaningful learning outcomes, and worthy performance. Additionally, participants' prior knowledge on topic used as a covariate.

3.4.1. Measures of Independent Variables

To be able to assign participants into mastery-goal and performance-goal groups, two dimensions of Motivated Strategies for Learning Questionnaire (MSLQ) were administered to participants. These two dimensions of MSLQ were intrinsic goal orientation and extrinsic goal orientation. To measure participants' individual interest, task value dimension of MSLQ was administered to the same participants. Based on interest, intrinsic goal orientation and extrinsic goal orientation scores, the participants were assigned to first, either mastery-goal or performance-goal groups, then, they were assigned either high or low interest sub-groups within each group defined by achievement-goal orientations. Measurement instruments of independent variables are discussed in details.

3.4.1.1. Achievement-Goal Orientation Instruments

Intrinsic and extrinsic goal orientation dimensions of MSLQ instrument, which has been developed by Pintrich, Smith, Garcia, and McKeachie (1991) and adapted into Turkish by Büyüköztürk, Erkan Akgün, Özkahveci, and Demirel (2004), has been used to measure participants' intrinsic and extrinsic goal orientations. Both intrinsic goal orientation and extrinsic goal orientation dimensions of the MSLQ instrument included 4 items within each dimension. Each item is scored on a 7 point Likert scale, from 1 (not at all true for me) to 7 (very true for me). For intrinsic goal orientation, higher scores represent higher internal motivation and vice versa. In similarly, higher scores in extrinsic goal orientation means that participant has higher intrinsic goal orientation and vice versa.

Because the instrument has not been developed for any specific subject or task, internal validities of intrinsic and extrinsic goal orientation dimensions were reported by Büyüköztürk et al. (2004) as 0.59 and 0.63 respectively. These two dimensions of the adapted version of MSLQ has been administered to 108 undergraduate students in Faculty of Education at Burdur Mehmet Akif Ersoy University after each item was re-specified toward certain subject which was Critical Web Searching and Reporting.

This was achieved replacing the "this course" statement within the items by the "*Online Critical Information Seeking and Reporting Course*" statement. Before the administration of the questionnaire, 108 participants were informed with aim of the course along with objectives, content, materials, homework, assessments and evaluation criteria.

Table 3.9. Intrinsic Goal Orientation Scale Item Statistics and Inter-Item Correlations

	Item Statistics			Inter-Item Correlation Matrix			
	Mean	Std. Dev.	N	1	2	3	4
1	4.89	1.88	108	1.00			
2	4.73	1.74	108	0.763	1.00		
3	5.39	1.72	108	0.677	0.661	1.00	
4	4.65	1.96	108	0.666	0.544	0.540	1.00

Table 3.10. Extrinsic Goal Orientation Scale Item Statistics and Inter-Item Correlations

	Item Statistics			Inter-Item Correlation Matrix			
	Mean	Std. Dev.	N	1	2	3	4
1	4.87	1.92	108	1.00			
2	4.38	1.04	108	0.630	1.00		
3	5.08	1.97	108	0.607	0.615	1.00	
4	5.28	1.93	108	0.432	0.394	0.701	1.00

Then, 108 participants were asked to fill out both questionnaires sincerely. The data gathered from 108 participants were analyzed and Cronbach alpha internal consistency statistics for intrinsic and extrinsic goal orientation yielded as 0.88 and 0.84 respectively. Item statistics and Inter-Item Correlation statistics for both orientation dimensions can be seen in Table 3.9. and Table 3.10. respectively.

3.4.1.2. Individual Interest Scale

To conceptualize individual interest, leading perspectives meet on the common ground that it has two central components: affect and value (Eccles, 1983; Renninger & Hidi, 2011; O'Keefe & Linnenbrink-Garcia, 2014; Schiefele, 2009). The affect component refers to the feelings associated to involvement with particular activity or content and is characterized by emotional states (i.e., excitement, enjoyment) whereas

the value component refers to importance of the content or activity and to utility to execute future goals (O'Keefe & Linnenbrink-Garcia, 2014). Similarly, value dimension of expectancy-value motivation model incorporates (a) the individual's perception of the importance of the task, (b) the individual's perception of the utility value of the task, and (c) the individual's personal interest in the task. All these three components share common concern of answering the question of Why am I doing this task? (Pintrich, 2003).

Considering the fact that both individual interest (affect and value) and task value (personal interest, utility value, and importance) seek for reasons to involve in a specific activity or content through asking very same questions which has been offered into differently named yet significantly overlapping categories aligned with respective theories. This significant overlap between the two components of individual interest (affect and value) and three components of value dimension of expectancy-value model had long been noticed and reported (see Eccles, 1983; O'Keefe & Linnenbrink-Garcia, 2014; Schiefele, 2009; Wigfield & Cambria, 2010). Looking at significant overlap between expectancy-value model and individual interest, "specifically, the affective component is similar to intrinsic value by focusing on enjoyment or subjective interest; whereas the value component overlaps both with utility value, in terms of whether the activity helps the individual meet future goals, and attainment value, in terms of the centrality of the domain to the self" (O'Keefe & Linnenbrink-Garcia, 2014, p.71).

Moreover, according to Wlodkowski (1988), all these three components of task value (personal interest, utility value, and importance) are parallel in children and college student whereas they may vary significantly in adults (Pintrich, 2003). Additionally, Hidi and Renninger (2006) indicated task value as a key contributor for individual interest in long-lasting activities such as learning.

By the reasons discussed above, and the review of the existent reliable and valid Turkish scales for measuring individual interest, we decided to obtain participants' individual interest levels via task value dimension of MSLQ scale.

Task Value dimension of MSLQ instrument, which has been developed by Pintrich, Smith, Garcia, and McKeachie (1991) and adapted into Turkish by Büyüköztürk, Erkan Akgün, Özkahveci, and Demirel (2004), has been used to measure participants' individual interest levels. Task value dimensions of the MSLQ instrument included 6 items within each dimension. Each item is scored on a 7 point Likert scale, from 1 (not at all true for me) to 7 (very true for me). For task value, higher scores represent higher task value and vice versa. Internal validity for task value dimension of an adapted version of MSLQ was reported by Büyüköztürk et al. (2004) as 0.80. For the very same reason with the goal orientation dimensions, task value dimension of the adapted version of MSLQ has been administered to 108 undergraduate students in Faculty of Education at Burdur Mehmet Akif Ersoy University after all items were re-specified toward certain subject which was Web Search & Information Report. This was achieved replacing the "this course" statement within the items by the "*Online Critical Information Seeking and Reporting Course*" statement. Before the administration of the questionnaire, 108 participants were informed with aim of the course along with objectives, content, materials, homework, assessments and evaluation criteria.

Table 3.11. Task Value Scale Item Statistics and Inter-Item Correlations

	Item Statistics			Inter-Item Correlation Matrix					
	Mean	Std. Dev.	N	1	2	3	4	5	6
1	5.51	1.62	108	1.00					
2	5.48	1.50	108	0.716	1.00				
3	4.79	1.70	108	0.601	0.608	1.00			
4	5.40	1.58	108	0.787	0.765	0.632	1.00		
5	4.55	1.63	108	0.646	0.655	0.735	0.719	1.00	
6	4.93	1.73	108	0.714	0.702	0.770	0.794	0.797	1.00

Then, 108 participants were asked to fill out both questionnaires sincerely. The data gathered from 108 participants were analyzed and Cronbach alpha internal consistency statistics for task value dimension yielded as 0.93. Item statistics and Inter-Item Correlation statistics for task value dimension of adapted MSLQ can be seen in Table 3.11.

3.4.1. Measures of Dependent Variables

Web Searching & Information Reporting achievement has been developed by the researcher and used for measuring participants' rote learning outcomes which is the first dependent variable used in the study. The second dependent variable is participants' meaningful learning outcomes. The researcher developed a performance task to measure participants' meaningful learning outcomes by the end of the course. The last dependent variable of the study is worthy performances of participants. Measurement instruments of dependent variables are discussed next.

3.4.1.1. Online Critical Information Seeking and Reporting Achievement Test

The researcher developed an achievement test for the intention of measuring rote learning outcomes of participants as a result of four-weeks lasting *Online Information Seeking and Reporting* course given as an essential part of the research. The test contains 28 multiple-choice questions. Details in the construction of *Online Information Seeking and Reporting* test as well as its validity and reliability test results have already been discussed in the instructional design section.

3.4.1.2. Performance task

In order to measure meaningful learning outcomes of the participants who have taken Online Information Seeking and Reporting course, the researcher designed and developed a performance task. While designing such task, objectives of the course as well as situational assessment are taken into consideration. The task has four primary sections: finding and evaluating source of information, writing concise paragraphs in

APA, providing an in-text citation, and creating a bibliography. The detailed information regarding performance task has already been provided in the instructional design section. The scoring rubric of the task is attached to appendixes. Based on the criteria depicted in the rubric, each participant has gained a performance score on the performance task they achieved. These scores are used as representatives for participants' meaningful learning outcomes.

3.4.1.3. Worthy Performance

Gilbert (2007) stated that "human competence is a function of worthy performance (W), which is a function of the ratio of valuable accomplishments (A) to costly behavior (B)" (p.18). The general formula for the worthy performance is W=A/B. To calculate the worthy performance, we needed to divide the accomplishment of subjects by the behavior they demonstrated during the task. As costly behaviors; the participants exert cognitive effort and spend time in order to perform a task. Cognitive effort scores used in this study is the estimation of depleted self-control resources, used attentional working memory capacity (or cognitive capacity) and task duration. For underlying assumptions and theoretical argument of total cognitive effort, refer to the 'rationale for measuring cognitive effort' section. To create a composite single total cognitive effort score among measured scores principal component analysis (PCA) were conducted. The worthy performance score is obtained through dividing performance score by total cognitive effort composite score.

3.4.1.4. Measure of Cognitive Effort

The total cognitive effort exerted during a task is measured using three different instruments: Computer-assisted program called ScriptKell, physical test using handgrip, and task duration using a stopwatch. To clarify the cognitive effort measure, the rationale for measuring cognitive effort was discussed first. Second, each measurement method was elaborated. Third, the rationale for calculating a single composite score for cognitive effort was briefly discussed.

3.4.1.4.1. Rationale for Measuring Cognitive Effort

A number of researchers who have studied and attempted to measure cognitive effort argued that is comprised of two dimensions: time and cognitive strain (Christensen-Szalanski, 1978; 1980; Cooper-Martin, 1994). Time refers to duration in which cognitive resources are utilized whereas cognitive strain refers to the amount of momentarily used cognitive effort which is not a constant value, it fluctuates from one moment to another (Cooper-Martin, 1994). For example, during a test which is comprised of multiple questions, the cognitive strain may increase as the questions get tougher. Therefore, total cognitive effort should embody both the depth of momentary cognitive strain and duration of cognitively demanding processes in which such strain is utilized (Cooper-Martin, 1994). The time component of this measuring system is obvious. It can be calculated via stop-watch. Yet, measuring the cognitive strain component is uneasy.

There is a large volume of published studies, which intended to measure the amount of cognitive effort exertion during cognitive processes, suggested two predominant techniques: dual-task and muscle strength. While the former technique relied on the fact that attentional working memory has a limited capacity, the latter relied on the assumption that depletion of cognitive resources resembles muscle fatigue. Likewise, dual-task technique grounded on attention theories, the muscle strength technique grounded in the strength model of self-control. A unique measurement technique for each method had been suggested in cognitive psychology literature.

To measure cognitive effort via dual-task method, computer-assisted tool called ScriptKell is created and released by (Annie Piolat et al., 1999) and successfully applied in countless studies regarding measuring cognitive effort as well as its allocations (i.e., Alves, Castro, & Olive, 2008; Olive et al., 2001; Olive et al., 2002; Olive et al., 2009; Piolat et al., 2001; Piolat, Barbier, & Roussey, 2008). Conversely, Muraven et al., (1998) suggested using handgrip to measure cognitive resource depletion based on the assumption that depletion of cognitive resources resembles

muscle fatigue. In this measurement technique, participants squeeze handgrip before and after the task which demands cognitive processes. The deviation between post- and pre-handgrip squeezing time provides depleted cognitive resources amount. This technique had been also used to measure cognitive effort exertion in cognitive psychology literature (i.e, Baumeister et al., 2007; Hong & Lee, 2008; Muraven et al., 1998; Muraven & Baumeister, 2000; O'Keefe & Linnenbrink-Garcia, 2014).

No single study exists in the literature which suggests an adequate formula for total cognitive effort. Relying on the works of Christensen-Szalanski, (1978; 1980) and Cooper-Martin, (1994), while measure total cognitive effort, it must be considered at least two constructs: cognitive strain and duration of the task which requires cognitive functioning. Time (or duration) can be measured using stop-watch and cognitive strain can be measured as one of the two ways: dual-task or muscle fatigue. Yet, there is no empirical evidence for the best measurement technique for the cognitive strain. Because, these techniques relies on different theories (attention theory vs strength theory of self-control) as well as distinct assumptions (attentional working memory capacity vs limited inner resource of cognitive effort). Since adequately measuring total cognitive effort is crucial for this study, the formulation of total cognitive effort should be reconsidered.

Taking both working memory capacity and limited resource views and grounding on Christensen-Szalanski, (1978; 1980) and Cooper-Martin, (1994) works, the best available way to measure total cognitive effort might be measuring all available variables: (1) depleted amount of limited cognitive effort, (2) momentarily used working memory capacity allocated to task, and (3) duration of task. And then, using principal component analysis, which is a data reduction technique, three scores will be reduced into a single composite score. Thus, this composite score will be an indicator for total cognitive effort exerted during a task.

3.4.1.4.2. Measuring Depleted Cognitive Resources

To assess depleted *Self-Control Resource* during the task, physical handgrip squeezing test administered twice: the right before the initiation of the task and the right after the completion of the task. The duration that the participants squeeze handgrip was timed in seconds using a stopwatch. The purpose of the first measure is to form a baseline for their initial self-regulatory resources. The difference between before and after measures will provide an amount of self-control resources depleted during the task. These two measures are suggested and successfully applied by Muraven et al. (1998) to testing regulatory depletion hypothesis. The rationale for this measure relies on the strength model of self-control (see Muraven et al, 1998; Baumeister et al., 2007; Muraven & Baumeister, 2000). A strength model suggests that "at any moment there is a fixed amount of regulatory capacity available for self-regulation" (Muraven et al., 1998, p. 775). Baumeister et al. observed that self-control is vulnerable to exertions and it resembles a muscle getting tired (2007).

3.4.1.4.3. Measuring Allocated Attentional Working Memory Capacity

ScriptKell, a computer-assisted experimental tool has been used to measure cognitive effort that participants exerted during a task performance. ScriptKell has been designed by Piolat, Olive, Roussey, Thunin, and Ziegler (1999) to manage triple task procedure which consists of: (1) primary task, (2) concurrent reaction time (as a secondary task), and (3) directed verbalization (as a retrospection task). ScriptKell program has been designed modulate Kellogg's triple task procedure. Among the experimental methods, ScriptKell program has been successfully applied in numerous experimental researches to measure cognitive effort and its allocation (i.e., Alves, Castro, & Olive, 2008; Olive, Alves, & Castro, 2009; Olive & Barbier, 2017).

Kellogg (1986, 1987a, 1988) has proposed an experimental procedure to measure the cognitive effort and its distribution through the triple task. During his experiment, task takers had a primary task which was a composition of a task was primary task along

with secondary task which was a Response Time (RT) task that in which task takers were asked to detect an auditory signal, and a directed retrospection as a third task. As a directed retrospection task participants were asked to “choose among four response categories (planning, translating, reviewing, or other) by selecting one of four response keys on the computer keyboard” (Piolat et al., 1999, p.114). This task was about determining the dispersion of cognitive effort exertion to the task dimensions, which were planning, translating, reviewing, etc. During the secondary task, participants heard an auditory signal in every 30 seconds of time. Participants were asked to say "stop" as quickly as possible once they detect that signal (RT task) (Piolat et al., 1999).

Because of the nature and the aim of the current study, dual-task procedure which is the modification of triple task technique (extracting the retrospection task which measures the allocation of total cognitive effort) has been applied successfully. Dual-task procedure is basically a triple task procedure lacking the third task (directed retrospection). Dual-task technique “requires participants to simultaneously perform two tasks (primary and secondary), this technique directly exploits the postulate that the cognitive system has a limited pool of cognitive resources” (Olive, 2004, p.2). Cognitive effort measuring procedure, which bases on evaluation of attentional demand characteristics of stimuli, initially prescribed by Ellis and Kreezer (1956) and their approach used divided attention method in which the participants performed primary task and secondary task which involves reaction time to visual or auditory stimuli (Tyler, Hertel, McCallum, & Ellis, 1979).

3.4.1.4.4. Measuring Task Duration

The total time in minutes that each participant spends on carrying out the task screened and reported. The time each participant spent to complete a task was determined via using a stopwatch and used as an indicator of their task persistence. This measure was used in several similar studies (see O’Keefe & Linnerbrink-Garcia, 2014). There was neither upper nor lower limit had been set for a duration of a task.

3.4.1.5. Calculation of Composite Cognitive Effort Exertion Score

As it was discussed above, we define worthy performance as ordinary performance/costly behavior. Therefore, to calculate worthy performance, two scores are needed which are ordinary performance score and costly behavior score. The ordinary performance score is the score given for the task achievement based on the evaluation rubric without considering the investment of any effort or cost to earn that score. To calculate costly behavior, all cost variables should be reduced to a single composite score, which refers to the total cognitive effort exertion score. It could be achieved via Principal Component Analysis.

Before conducting PCA, assumptions were checked to see if the data are convenient for conducting PCA. The data that would be redacted were continuous, as the analysis requires. To see if all three variables were linearly related, Pearson Product Moment Correlation Coefficients were calculated. The correlation matrix is given in Table 3.12. below.

Table 3.12. Correlations

		Total Cognitive Effort	Time Spent	Self-Regulation Depletion
Total Cognitive Effort	Pearson Correlation	1.00		
	Sig.			
	N	125		
Time Spent	Pearson Correlation	0.456	1.00	
	Sig.	0.000*		
	N	122	125	
Self-Regulation Depletion	Pearson Correlation	0.231*	0.302*	1.00
	Sig.	0.010	0.001	
	N	125	125	125

* Correlation is significant at 0.001 level (2-tailed).

The first stage of CPA analysis is to test the adequacy of the sample. Thus, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity were carried out to make sure the sample was adequate. KMO is a measure to quantify the degree of intercorrelations among the continuous variables (Kaiser, 1974). A KMO

statistic varies between 0 and 1. The value greater than 0.50 are acceptable and shows that the data is suitable for data reduction (Field, 2009). Also, Bartlett's test of sphericity has detected adequate correlation between the variables. The results of the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.598 and Bartlett's test of sphericity was 41.672 ($p<.05$) which indicated the adequacy of the sample for PCA analysis. The values can also be seen in Table 3.13. below.

Table 3.13. KMO and Barlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.598
Barlett's Test of Sphericity	Approx. Chi-Square	41.672
	Df	3
	Sig.	0.000

The last assumption checked for PCA was not having any significant outlier. The scores on each variable were scrutinized via boxplots. There was not any significant outlier detected.

Table 3.14. Total Variance Explained

Component	Initial Eigenvalues			Extraction of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.669	55.636	55.636	1.669	55.636	55.636
2	0.795	26.510	82.148			
3	0.536	17.854	100.00			

As can be seen in Table 3.14. above, only the first principal component has eigenvalue over 1.00 and explains 55.6% of the total variability in the data. It can be concluded that a one-factor solution will probably be adequate. The scree plot provided in Figure 3.2. below supported this conclusion.

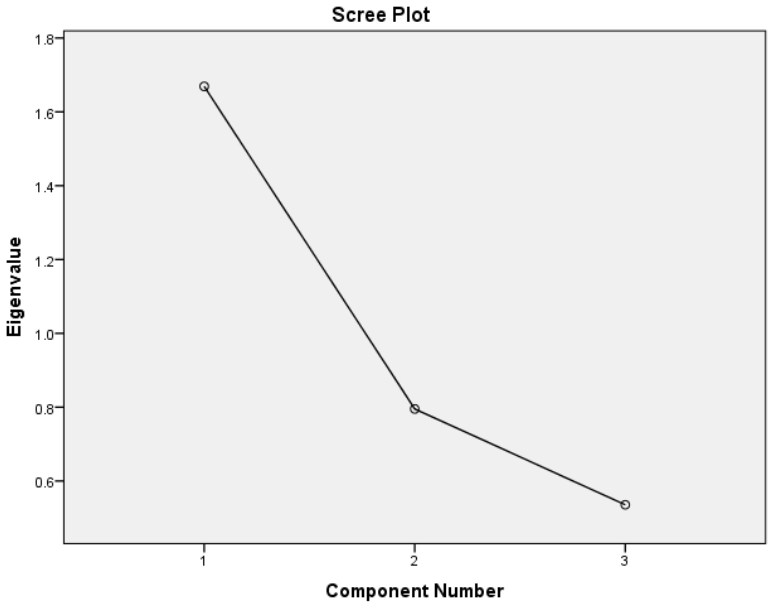

Figure 3.2. Scree Plot

Finally, the component matrix provided in Table 3.15. below was used to calculate costly behavior scores for each participant. In order to do so, all scores in each variable transformed into T scores (mean of 50 and standard deviation of 10) first.

Table 3.15. Component Matrix

	Component
	1
Time Spent	0.815
Total Cognitive Effort	0.775
Self-Regulation Depletion	0.635

Then, each score in each variable (time, self-control resource depletion, and allocated cognitive capacity) was multiplied with corresponding component value. New scores for each subject in these three variables added together.

3.5. Experimental Procedure

At the beginning of the research, a hundred and eighty-seven volunteered participants were gathered into a lecture hall. The researcher informed participants with the aim of

the *Online Critical Information Seeking & Reporting* course. He went through the objectives, contents, instructional strategies and materials, assessments tools and the requirements of the course. This presentation lasted 40 minutes. Then, he asked hundred and eighty-seven participants to fill out the questionnaires intend to measure participants' achievement goals toward the course. The researcher reminded that the response they gave to the questionnaire would neither affect their grades, nor affects his attitude toward participants; because, this four-weeks lasting course is offered within the scopes of project management course for fourth graders and scientific research course for third graders. The experimental procedure is illustrated in Figure 3.3.

The participants initially grouped based on their predominant achievement goals. To achieve this, participants' responses to achievement goal orientation questionnaires are used. The total scores on each questionnaire (minimum 4 maximum 28 points) are calculated and coded into Microsoft Excel Worksheet. To determine each participant's predominant achievement goal orientation, the ratio of scores was taken such that mastery-goal scores divided by performance-goal scores. However, because the ratio of the minimum intrinsic score to maximum extrinsic score (i.e., 4/28) is not the exact opposite of the ratio of maximum intrinsic score to minimum extrinsic score (i.e., 28/4); log of these ratio scores were taken to put these values in the same scale. Thus, log-odds of (intrinsic goal score) / (extrinsic goal score) became our parameter for classifying examinees into one out of the two groups. Notice that log (4/28) = -0.85; while log (28/4) = 0.85.

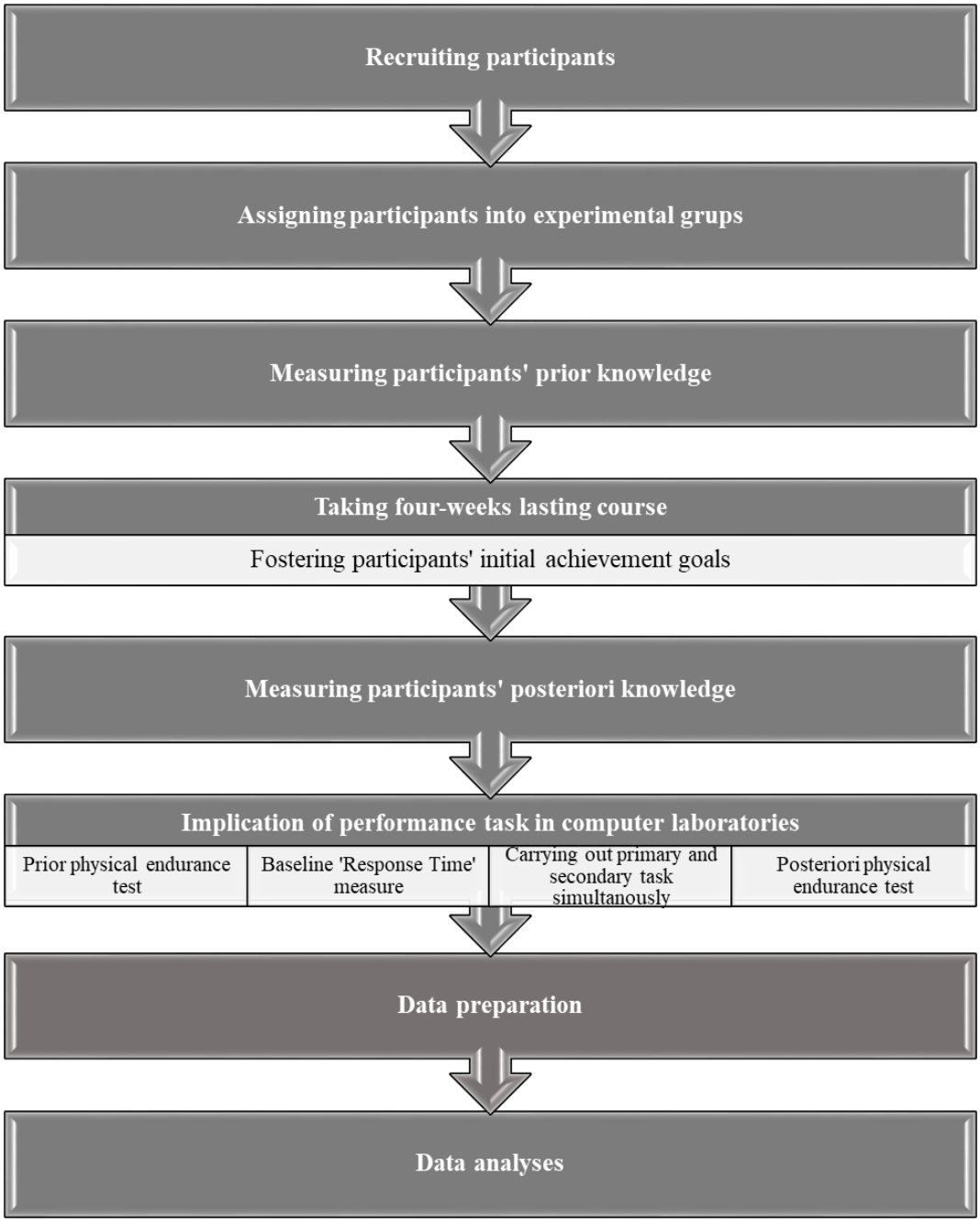

Figure 3.3. Experimental Procedure Flowchart

Changing the link of the relative achievement goal orientation scores enabled us to make more meaningful comparisons of examinees based on their sub-scores. Through this process, participants' predominant goal (or relatively higher achievement goal) sores are distributed -1 and +1 continuum. To make sure that the groups are distinct,

the participants with mastery-goal/performance-goal ratio log scores close to 0 (i.e., between -0.1 and +0.1) dismissed from the study. Indeed, they still attended the study but the data gathered from these participants were omitted from analysis.

At the beginning of the study, the researcher administered the questionnaire which measures participants' individual interest levels toward the whole package of the instruction. The questionnaire contained six items (the scale was 7-point likert). Therefore, the participants' total scores on this questionnaire are ranged from 6 to 42. The researcher calculated and coded each participant's interest score into Microsoft Excel Worksheet in aligned with their ID numbers. While administering interest questionnaire, the researcher reminded again that the response they gave to the questionnaire would neither affect their grades nor affects his attitude toward the participants. Thusly, he asked them to be honest and sincere while filling out the questionnaire.

Mastery-goal oriented and Performance-goal oriented groups are independently subdivided into high interested, low interested, and moderately interested groups. The allocation of interest groups is conducted by median split technique. Approximately eight participants (approximation was due to having repeated scores) around the median of each achievement goal groups considered as moderately interested participants. Due to the fact that this research concerned with the effects of high and low individual interest on certain variables, the participants demonstrating moderate interest were dismissed from the study. The illustration of grouping participants into mastery-goal and performance-goal groups are presented in Figure 3.4. below.

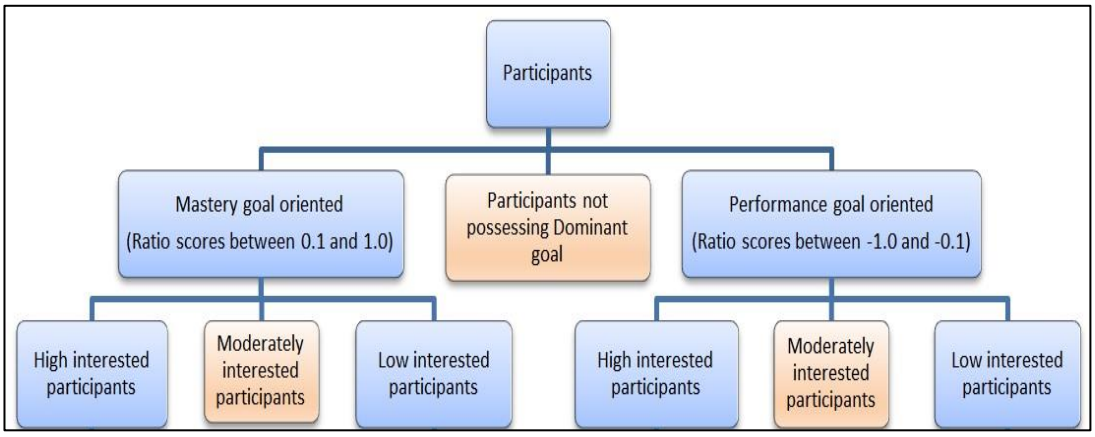

Figure 3.4. Illustration of Groups and Sub-groups Defined by Achievement Goals and Individual Interest

Among 187 participants, twelve participants dropped out the study, twenty-seven participants did not fit in any of the experiment groups, and thirteen participants omitted from the study due to providing at least one datum considered as a significant outlier. Thus, the number of participants in each group was as presented in Table 3.16. below.

Table 3.16. Number of Participants Fall into Each Group Defined by Independent Variables

Individual Interest Levels	Achievement Goal Orientations	
	Mastery-goal oriented	Performance-goal Oriented
High Interested	33	27
Low Interested	30	35

Before the beginning of first in-class meetings, prior knowledge of the participants was assessed by administering *Online Critical Information Seeking and Reporting* achievement test. The test included 28 multiple choice questions. The test duration was 40 minutes. The test was administered by one research assistant along with one student assistant in each classroom of four. The answers of each participant to twenty-eight multiple-choice questions were scored based on answer key developed by the researcher. The participants' pretest scores were coded into Microsoft Excel Worksheet along with their ID numbers for feature analysis.

Due to a large number of participants, *Online Critical Information Seeking and Reporting* course have took place in four distinct sections. First two sections were offered to mastery-goal oriented participants only whilst the latter two sections were offered to performance-goal oriented participants only. The instructional goals, objectives, strategies, materials, and assessment instruments and evaluation criteria were very similar in all sections. Yet, mastery-goal orientation is fostered during the instruction of the former two sections since the participants had already demonstrated mastery achievement-goal. The aim of fostering their mastery achievement goals was keeping initial groups defined by the achievement goal orientation constant. Similarly, throughout the four-weeks lasting course, performance-goal orientation was fostered in latter two sections since their participants had already demonstrated performance achievement goal. The purpose of this necessary manipulation was also due to keeping initial groups constant. The manipulations of fostering two discrete achievement goals in former and latter course sections (may also be called as mastery-goal sections and performance-goal sections) are briefly discussed below.

> *"When we examine the characteristics of mastery-oriented learners, one quality that seems to stand out is their willingness to take risks and learn from their mistakes. They appear to be confident that nothing bad will happen to them when they fail. They feel that their classroom is a safe place, where they are supported when they stumble and assisted when they try. If this is indeed the underlying base for mastery orientation, then as instructors we need to find ways of helping students feel safe so that they are willing to take risks*" (Svinicki, 2010, p.25).

Svinicki (2010) suggested some class strategies to foster mastery orientation. Some of these strategies I was able to apply during the former two sections (mastery-goal sections) of the course. Yet, one of the strategies could not be applied during these sections due to the concern of affecting participants' situational interest levels which may mislead the results of the study. The strategy could not have been used in this

study was fostering community within the classroom. Because it would alter the instructional strategies applied in the classroom which might result in an alteration in mastery goal-oriented participants' situational interest. To help the participants to remain or even enhancing their mastery achievement goal levels, the following in-class strategies are applied.

- In class activities and homework, participants were provided with choices on the topic they want to make online research and writing a report about.
- To play a role model, the researcher gave an example of his works and applied strategies he applies while making an online search in order to locate the adequate resources. Then, explained how the online search processes and strategies covered in the course saved time to him, so he straightened his arguments while writing academic papers.
- The importance of learning from mistakes was emphasized during these sections. The researcher gave participants constructive feedbacks during lab practices and assignments. Thus, mastery goal-oriented learners had an opportunity to revise their assignment reports. Therefore, the researcher did not only point out the mistakes, rather he encouraged participants to learn from their own mistakes and improve their products.

Mastery goal-oriented participants were reminded in every single class meeting that what grade they get from the course is not important. What important in this course is a personal improvement? In this regard, the focus of the course was restated at the beginning of each class meeting as announcing the following statement.

> *"Remember! The focus of the course is improving your skills that necessary for conducting a successful online search as well as selecting critical information and reporting that information. I want you to not worry about grading, just focus on your own improvement"*.

On the contrary, the participants in the performance-goal sections were suggested to strive for success by being at the top twenty percent in the classroom. They were

informed that the scores they gain on the achievement test would affect the grade in the courses (either the project management course or the scientific research course that this micro course takes place in. Thirty percent of the grade obtained in this micro-course will be added to your final grades on either the project management course or the scientific research course as a bonus. They were also explained how the relative positioning is important to gain higher grade than classmates. Thus, it has been made it clear that they must perform better than others in this micro course. In order to remain these participants extrinsic goal orientations (performance-goal orientations) during each in-class activities, high performers were awarded free energy drink Red Bull. The importance of grading in this course is emphasized in each class meetings.

At the end of four-weeks lasting *Online Critical Information Seeking and Reporting* course, the researcher administered *Online Critical Information Seeking and Reporting* achievement test to all participants. The test included 28 multiple choice questions. The test duration was 40 minutes. The test was administered by one research assistant along with one student assistant in each classroom of four. The answers of each participant to twenty-eight multiple-choice questions were scored based on answer key developed by the researcher. The participants' pretest scores were coded into Microsoft Excel Worksheet aligned with their ID numbers for feature analysis.

In order to administer a performance task successfully, the researcher recruited and trained three performance test administration teams. These three teams managed experimental lab procedure in three different computer laboratories simultaneously. Demographics and duties of each team member are given in Table 3.17. below.

Table 3.17. Demographics and duties of each member of the managerial teams

Lab Code	ID	Gender	Position	Major	Duty
303	1	Male	Assistant Professor	Measurement & Evaluation	Time Keeper
303	2	Male	Undergraduate	CEIT	ScriptKell & Task Man
303	3	Male	Undergraduate	CEIT	Handgripper

304	4	Male	Undergraduate	CEIT	ScriptKell & Task Manager
304	5	Male	Research Assistant	Science Education	Time Keeper
304	6	Male	Undergraduate	CEIT	Handgripper
306	7	Male	Research Assistant	Science Education	Time Keeper
306	8	Female	Graduate	Science Education	Handgripper
306	9	Male	Undergraduate	CEIT	ScriptKell & Task Manager

In training sections, requirements and procedure of task are presented to every member of each team. Then, each person has assigned a single duty. Specifically, one person (Handgripper) would be in charge of administering pre and post physical endurance tests in which the participants are required to squeeze handgrip as long as they can. Pre-physical endurance test would take place right before the task whereas post physical endurance test would be administered as soon as the participant completes the task. The duty of another person (Time Keeper) was jotting down what time each participant begins and completes the task. Duration of the task is counted from the time that the participant started working on the primary task to time that the participant either complete or drop the task. Passing of time before the beginning of actual task such as duration of pre-physical endurance test or Response Time (RT) baseline measurement were not counted in task duration (persistence). The last person (ScriptKell & Task Manager), in each team, was responsible for setting up and managing ScriptKell program during the task.

Performance task was taken place in three different computer laboratories simultaneously. Each laboratory had thirty-two desktop computers. Each participant had to use two contiguous desktops simultaneously: one desktop for the primary task, one desktop for secondary task. Therefore, maximum sixteen participants have taken a task simultaneously in each laboratory of three. The researcher set three sections in each lab in a single day. The sections started at 10:00 AM, 14:00 PM and 18:00 PM. The sections beginning times were intentionally dispersed within a day due gave participants an opportunity to take a task in their best moods. The reason for giving an

optional time relies on the fact that half of the participants were evening education students whereas the other half attends school a daytime.

The schedules of computer laboratories were arranged in a way that at least three performance task sections to be held during a day. Then the performance task schedules were shared with the participants via Google Drive. The participants reviewed the schedules and available seats in each section. Then the participants informed the researcher about the section and the day that they were available and willing to take the task. Researcher-participant communication during the task time arrangements took place via pre-created WhatsApp groups. Based on the participants' requests, the researcher updated each lab section schedule. Google Drive allowed participants to monitor all updates in the schedules.

The participants individually performed the task which had been designed as three folded: the primary task, the secondary task, and pre-post physical endurance tests. Primary and secondary tasks are employed simultaneously. And, physical endurance test took place twice: before and after simultaneously performed primary and secondary tasks.

The primary task is an Internet-based performance task intends to measure participants meaningful learning outcomes of the micro course regarding Online Information Seeking and Reporting. The detailed information regarding this course is provided in the instructional design section under the assessment instruments subheading. The performance of each participant was scored based on the performance rubric attached to the appendix.

The secondary task was to respond an auditory probe by right-clicking the mouse connected to the desktop running ScriptKell software. The mouse located to upper-right side on the table where the participant performs the primary task. The secondary task also called Response Time (RT) task. RT task has two phases: baseline and main task. Baseline RT had been measured before the primary task started. During the measurement of baseline RTs, participants were presented with 14 auditory probes

("beep" sound). They had been asked to respond to the probe as rapidly as they were able to. These 14 baseline auditory signals were presented within 5- and 15-seconds time interval as suggested by Kellogg (1988). The first 4 response-times were considered as warm-up activity. Therefore, baseline RT was calculated as the mean of the latter ten response time.

The former phase of the secondary task was carried out simultaneously with the primary task mentioned above. In the second phase of the secondary task, the participants were also asked to respond an auditory probe by right-clicking a mouse as rapidly as possible. The auditory signals throughout the primary task were presented in every 90-120 seconds time interval. The mean of RT has been calculated and offered by ScriptKell software itself. Screen captures of the baseline RT task and main task settings were given in Figure 3.5. and Figure 3.6. respectively.

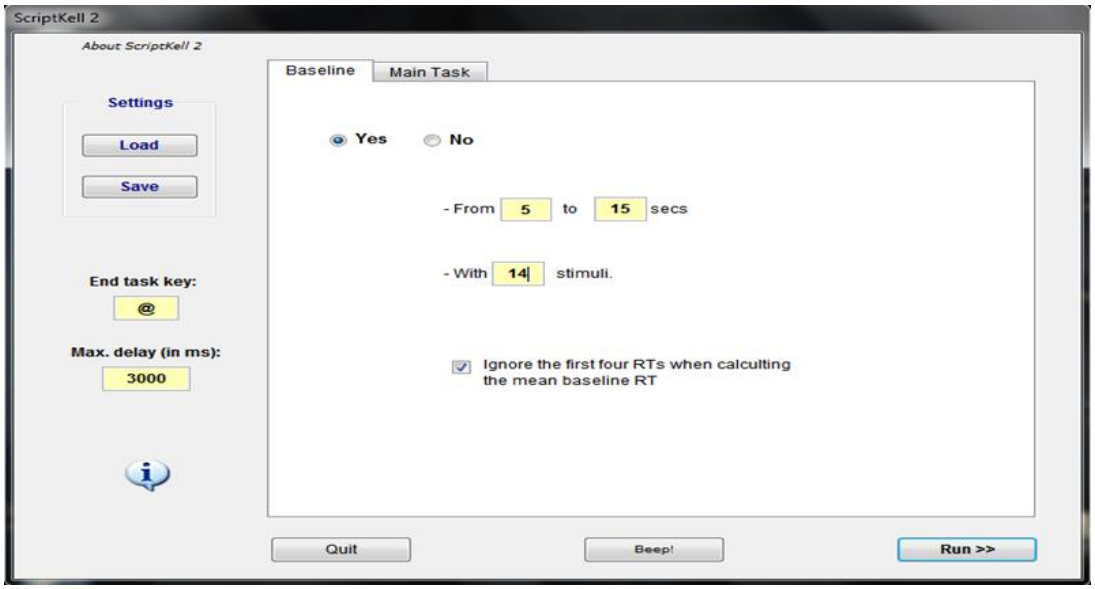

Figure 3.5. Baseline RT Task Settings

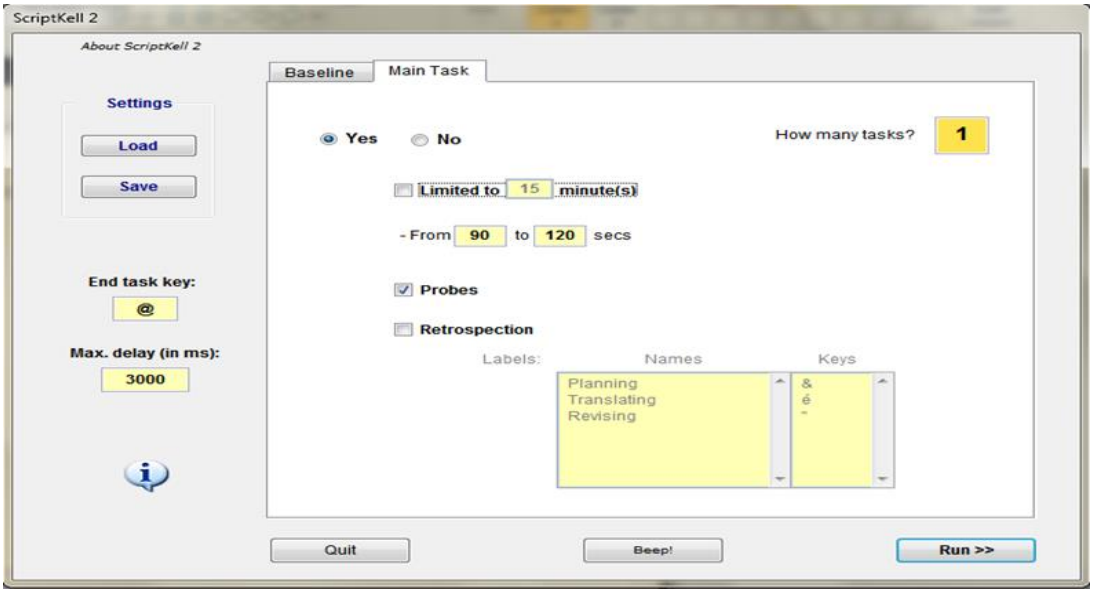

Figure 3.6. Main Task Settings

Attentional working memory capacity allocated to the primary task was estimated over the secondary task. In order to do so, the participants' mean baseline RTs (i.e., mean response time to auditory probes while not being assigned any other task) was subtracted from each of the main RTs (i.e., mean response time to auditory probes while carrying out the primary task). The secondary (responding an auditory probe) task does not interfere with the performance on the primary task (see, Olive & Barbier, 2017).

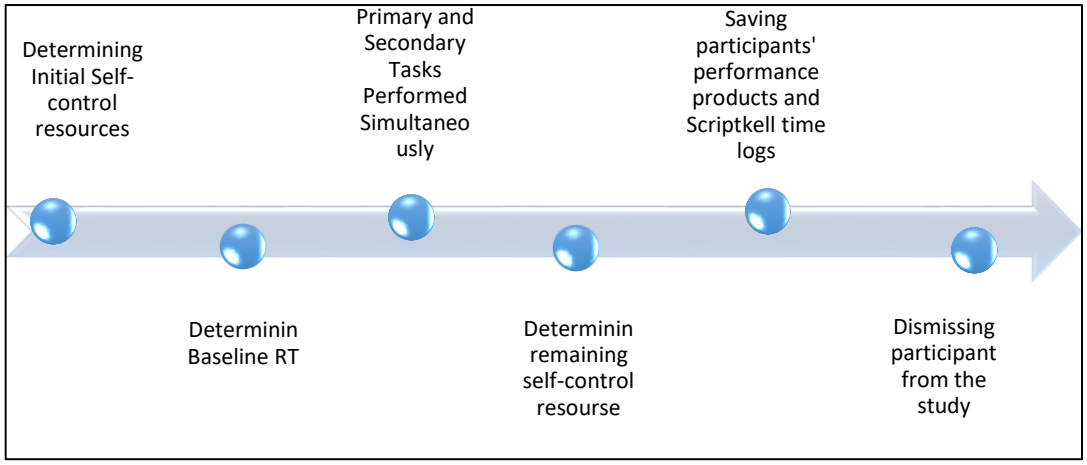

Figure 3.7. Task Procedure Timeline

In order to measure self-control resource depletion during the performance task, the participants took a physical endurance test twice: before and after the simultaneously performed primary and secondary tasks. In physical endurance tests, the participants were asked to squeeze a handgrip as long as they can. A piece of paper attached between the handles of the handgrip. When the participants loosen their hands, that piece of paper would fell down. The duration that the participants squeeze the handgrip was measured in seconds using chronometer. Deviation time period between post and pre-physical endurance tests provided estimation on depleted self-control resource. Figure 3.7 illustrates the timeline for performance task procedure only.

3.6. Data Analyses

Several statistical techniques were applied in order to investigate and analyze the data collected throughout the study. These statistical techniques are preliminary data analyses, descriptive statistics, estimation of total cognitive effort, and inferential statistics.

3.6.1. Preliminary Data Analyses

In this section, outliers are determined and normality checked. Univariate outliers in each data set were visually scrutinized and determined through the boxplots and scatterplots. To check normality, skewness, and kurtosis values were assessed in each data set. The skewness and kurtosis values between -2 and +2 were considered to be acceptable to demonstrate univariate normality (Field, 2009; Green & Salkind, 2008). Additionally, the Shapiro-Wilks Test of Normality had been conducted and the statistic values and significance value were reported.

3.6.2. Analysis of Rote Learning Outcomes

The first purpose of this research is to investigate the effects of individual interest levels and achievement goal orientation on undergraduate students' rote learning outcomes. With this indention, achievement pretest and posttest had been conducted. The gain score is calculated by subtracting pretest scores from the post test scores.

Through the gain scores, the participants' improvements on rote learning outcomes were estimated. Yet, in order to see the effects of individual interest and achievement goals over rote learning outcomes, two-way analysis of covariance was conducted. Alpha level of 0.05 used to test statistical significance. Before conducting the two-way analysis of variance, the following assumptions had been checked:

- Assumption 1: The population distribution on the dependent variable is to be normally distributed for any specific value of the covariate within each cell defined by independent variables (Green & Salkind, 2008).
- Assumption 2: The population variances of the dependent variable for the conditional distributions described in assumption one are the same (Green & Salkind, 2008).
- Assumption 3: The scores on dependent variables are independent from each other (Green & Salkind, 2008).

3.6.3. Analysis of Meaningful Learning Outcomes

The second purpose of this research is to investigate the effects of individual interest levels and achievement goal orientation on undergraduate students' meaningful learning outcomes. With this intention, performance task had been conducted. The performance scores of the participants were given based upon the assessment rubric provided in the appendix. Through these performance scores, the participants' improvements on meaningful learning outcomes were estimated. Yet, in order to see the effects of individual interest and achievement goals over meaningful learning outcomes, two-way analysis of covariance was conducted. Alpha level of .05 used to test statistical significance. Before conducting the two-way analysis of variance, the following assumptions had been checked:

- Assumption 1: The population distribution on the dependent variable is to be normally distributed for any specific value of the covariate within each cell defined by independent variables (Green & Salkind, 2008).

- Assumption 2: The population variances of the dependent variable for the conditional distributions described in assumption one are the same (Green & Salkind, 2008).
- Assumption 3: The scores on dependent variables are independent from each other (Green & Salkind, 2008).
- The covariate is linearly related to the dependent variable within all cells defined by the factors (Green & Salkind, 2008).
- The slopes relating the covariate to the dependent variable are equal among all cells defined by the factors (Green & Salkind, 2008).

3.6.4. Analysis of Worthy Performance

The second purpose of this research is to investigate the effects of individual interest levels and achievement goal orientation on undergraduate students' meaningful learning outcomes. In order to do so, two ways ANCOVA was conducted. Worthy performance scores were used as dependent variable whereas the pretest achievement scores were used as a covariate. The alpha level that used to determine statistical significance was 0.05. Before conducting the two-way analysis of variance, the following assumptions had been checked:

- Assumption 1: The population distribution on the dependent variable is to be normally distributed for any specific value of the covariate within each cell defined by independent variables (Green & Salkind, 2008).
- Assumption 2: The population variances of the dependent variable for the conditional distributions described in assumption one are the same (Green & Salkind, 2008).
- Assumption 3: The scores on dependent variables are independent from each other (Green & Salkind, 2008).
- The covariate is linearly related to the dependent variable within all cells defined by the factors (Green & Salkind, 2008).

- The slopes relating the covariate to the dependent variable are equal among all cells defined by the factors (Green & Salkind, 2008).

The methodology for answering research questions were summarized in Table 3.18.

Table 3.18. Methodology Summary Table

Research Questions	Sample	Variables	Instruments	Analyses
What is the effect of achievement-goal orientation and individual interest on undergraduate students' rote learning?	125	Independent: Individual Interest and Achievement-goal orientations Dependent: Achievement test gain scores	Individual interest: MSQL task value dimension Achievement-goal orientation: MSQL intrinsic and extrinsic goal dimensions Achievement test: Information seeking and Reporting test	2x2 ANOVA
What is the effect of achievement-goal orientation and individual interest on undergraduate students' meaningful learning?	125	Independent: Individual Interest and Achievement-goal orientations Dependent: Performance assessment task Covariate: Achievement pre-test	Individual interest: MSQL task value dimension Achievement-goal orientation: MSQL intrinsic and extrinsic goal dimensions Performance assessment task: Information seeking and Reporting task Achievement pre-test: Information seeking and Reporting test	2x2 ANCOVA
What is the effect of achievement-goal orientation and individual interest on undergraduate students' worthy performance?	125	Independent: Individual Interest and Achievement-goal orientations Dependent: Worthy performance Covariate: Knowledge level	Individual interest: MSQL task value dimension Achievement-goal orientation: MSQL intrinsic and extrinsic goal dimensions Worthy performance: Information seeking and Reporting task scores divided by cognitive effort measured via dual task, physical endurance test, and time Knowledge level: Information seeking and Reporting test	2x2 ANCOVA

CHAPTER 4

RESULTS

Prior to the analyses, data sets were screened in terms of outliers and their shapes. Then three analyses (i.e., a 2x2 ANOVA and two 2x2 ANCOVAs) were conducted to evaluate (a) the effects of two factor achievement goal conditions and two levels of individual interest on rote learning outcomes; (b) the effects of two achievement-goal conditions and individual interest levels on participants' meaningful learning outcomes; and (c) the effects of two achievement-goal conditions and interest levels on worthy performance. Before each analysis, all related assumptions were checked.

When inferences are made based on statistical modeling, it is important to clean the data to make sure that observations best represent the phenomenon. Outliers are the greatly deviating data values that may adversely affect analysis results. First of all, outliers within each data set were identified by screening the data through the boxplots and scatterplots. The participants with significant outlier(s) in any data set excluded from further analysis. A total of 13 participants flagged at least one outlier. The scatterplots of each data set are presented below in Figure 4.1 through 4.5.

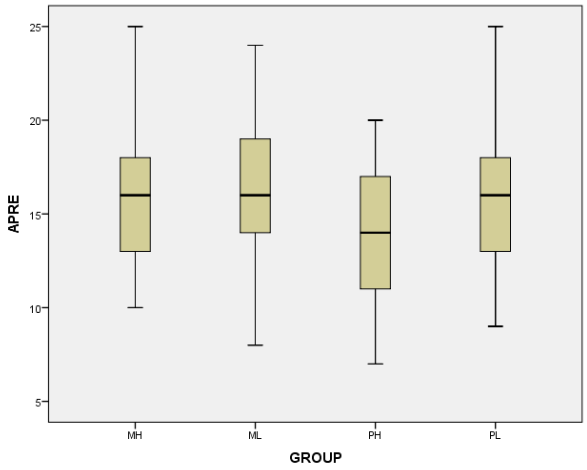

Figure 4.1. Boxplot: Achievement Pretest

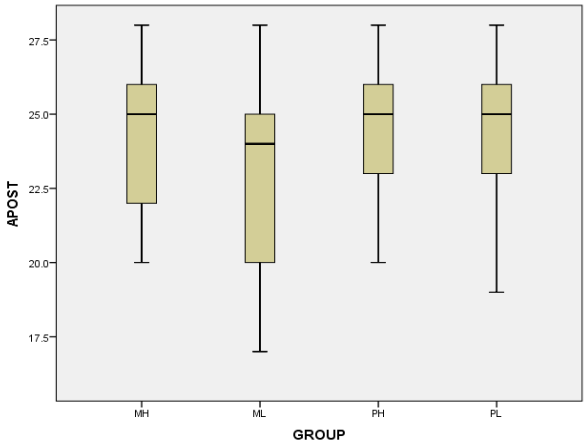

Figure 4.2. Boxplot: Achievement Posttest

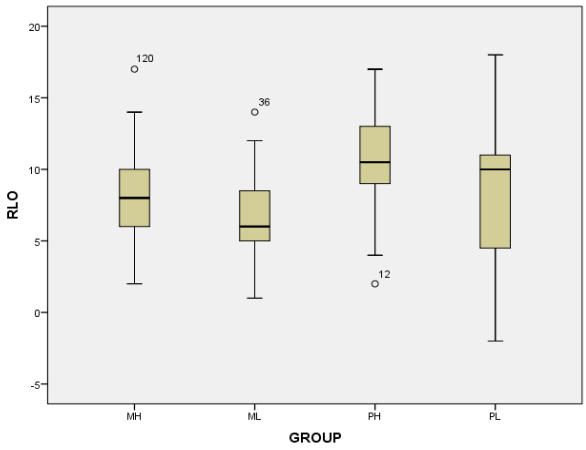

Figure 4.3. Boxplot: Rote Learning Outcomes

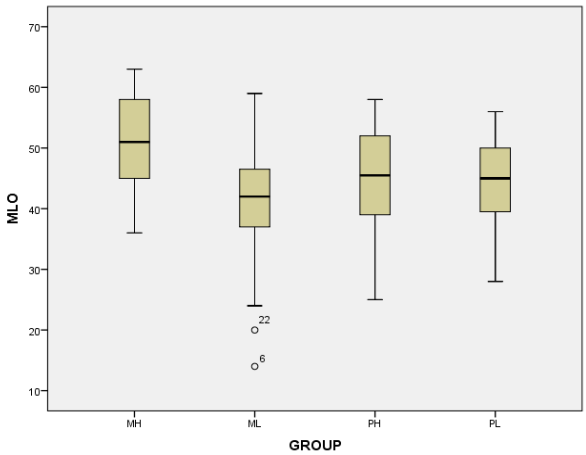

Figure 4.4. Boxplot: Meaningful Learning Outcomes

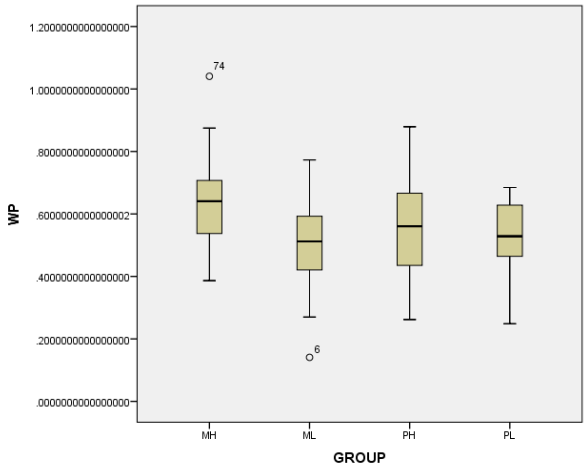

Figure 4.5. Boxplot: Worthy Performance

All data obtained from 13 participants with significant outlier(s) were removed from the data sets. Furthermore, six participants (i.e., 6, 12, 22, 36, 74, and 120) demonstrated at most two deviating data values (see figures 7.1. through 7.5), however, these values were not significantly different from the rest of the data so that participants yielding these results were kept for the further analyses.

Because most of the statistical tests rest upon normality, non-normal data yields obtaining inaccurate results from those tests. Thus, prior to conducting analyses, normality or the data were checked. To fulfill this task, skewness and kurtosis values were considered. Table 4.1 below provides the skewness and kurtosis values for each group of participants defined by two independent variables. The skewness and kurtosis values between -2 and +2 are considered as acceptable for demonstrating univariate normality (Field, 2009; Green & Salkind, 2008).

Table 4.1. Normality Test Results of Dependent Variables and Covariates

Variable	Groups	Skewness	Kurtosis	Shapiro-Wilk Test	
				Statistic	Sig.
Achievement Pretest					
	MH	0.361	0.172	0.970	0.47
	ML	-0.398	-0.402	0.960	0.37
	PH	-0.240	-1.015	0.948	0.15
	PL	.0300	-0.274	0.978	0.71
Achievement Posttest					

	MH	-0.361	-0.954	0.938	0.06
	ML	-0.344	-1.136	0.925	0.05
	PH	-0.634	-0.390	0.928	0.04
	PL	-0.651	0.077	0.941	0.06
Rote Learning Outcomes					
	MH	0.256	0.349	0.973	0.58
	ML	0.362	-0.337	0.956	0.18
	PH	-0.201	-0.318	0.972	0.60
	PL	-0.294	-0.489	0.962	0.26
Meaningful Learning Outcomes					
	MH	-0.180	-1.012	0.960	0.25
	ML	-0.570	0.344	0.954	0.27
	PH	-0.559	-0.378	0.950	0.16
	PL	-0.343	-0.756	0.959	0.22
Allocated Attentional Memory Capacity					
	MH	0.640	-0.227	0.947	0.11
	ML	0.586	-0.542	0.939	0.12
	PH	0.678	0.510	0.968	0.48
	PL	0.602	-0.174	0.960	0.24
Depleted Self-Control Resource					
	MH	-0.438	-0.486	0.961	0.28
	ML	-0.312	-0.711	0.957	0.32
	PH	0.294	-0.484	0.970	0.53
	PL	-0.641	0.734	0.948	0.10
Time Spent					
	MH	0.109	-0.278	0.977	0.68
	ML	0.090	.0237	0.981	0.88
	PH	0.414	-0.467	0.962	0.35
	PL	.416	.241	.978	0.70
Worthy Performance					
	MH	0.752	1.436	0.965	0.36
	ML	-0.449	0.630	0.984	0.94
	PH	0.278	-0.462	0.978	0.76
	PL	-0.609	-0.366	0.940	0.06

As it can be seen from the table, all the variables' skewness and kurtosis values are within these limits. Thus, it can be argued that normality assumptions for all parametric test used in this study are tenable. Additionally, Shapiro-Wilks Test of Normality had been conducted and the statistics and significance value were reported in Table 4.1. above.

4.1. Results on Rote Learning Outcomes

A 2 x 2 ANOVA was conducted to evaluate the effects of two factor achievement goal conditions and two levels of individual interest on rote learning outcomes. Results of the conducted descriptive analysis for rote learning outcomes are presented in Table 4.2.

Table 4.2. Descriptive Statistics of Rote Learning Outcomes

Achievement Goals	**Interest Levels**	**N**	**Mean**	**Std. Dev.**	**Variance**
Mastery-goal	High Interest	33	8.18	3.41	11.65
	Low Interest	27	6.89	3.38	11.41
	Total	60	7.60	3.43	11.76
Performance-goal	High Interest	30	10.47	3.88	15.02
	Low Interest	35	8.51	4.77	22.79
	Total	65	9.42	4.46	19.89
Total	High Interest	63	9.27	3.79	14.17
	Low Interest	62	7.81	4.27	18.23
	Total	125	8.54	4.09	16.73

Note: N is the number of participants in the groups.

Then the assumptions of ANOVA were checked to see if the assumptions were met. To check the normality assumption, first, skewness and kurtosis values on dependent variables for each cell defined by the independent variables were checked. Skewness and kurtosis values for each cell were between -2 and +2 critical values. Normality was also checked through conducting Shapiro-Wilk test of normality. The results of these tests confirmed that the subjects on the dependent variable were normally distributed among the cells defined by the independent variables. Skewness and kurtosis values as well as Shapiro-Wilk tests results can be seen in Table 4.1.

For the second assumption, which is homogeneity of variances on dependent variable among the cells, Levene's Test of Equality of Variances had been conducted. Based

on the Levene's test results, the null hypothesis (i.e., the error variance of the dependent variable is equal across groups) is retained, F (3, 121) = 2.39, p = 0.072. Therefore, because the assumptions were met, 2 x 2 ANOVA was conducted to evaluate the effects of two achievement-goal conditions and interest levels on rote learning outcomes.

The ANOVA yielded no significant interaction between achievement-goal and interest levels, F (1, 121) = 0.217, p = 0.642, partial $\eta^2 < 0.01$. This result indicated that there was no significant difference in the effect of goal orientation on rote learning outcomes for any level of individual interest. Thus, we were to proceed to report the simple main effects. The test results of between subject effects are given also given in Table 4.3.

Table 4.3. Test of Between Subject Effects: Rote Learning

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	189.22	3	63.07	4.06	0.009	0.091
Intercept	8971.47	1	8971.47	577.48	0.000	0.827
Goal Orientation	118.30	1	118.30	7.615	0.007	0.059
Individual Interest	81.49	1	81.49	5.245	0.024	0.042
Goal*Interest	3.37	1	3.37	0.217	0.642	
Error	1879.79	121	15.54			
Total	11194.0	125				
Corrected Total	2069.01	124				

Note: df stands for the degrees of freedom; F represents the F-statistic; and Sig. indicates whether the results are statistically significant considering the given alpha (i.e., significance) level.

A 2 x 2 ANOVA yielded significant main effect for both achievement-goal orientation F (1, 121) = 7.615, p = 0.007, partial $\eta^2 = 0.059$, Cohen's d = 0.50 and interest level F (1, 121) = 5.245, p = 0.024, partial $\eta^2 = 0.042$, Cohen's d = 0.42. Due to the fact that

2 x 2 ANOVA did not yield interaction effect, the main effects can be safely interpreted.

It can be concluded that, performance-goal oriented participants' rote learning outcomes on the subject matter was significantly higher (M = 9.42) than mastery-goal oriented participants' (M = 7.60). The types of achievement-goal orientation have moderate to large effect on rote learning in favor of performance-goal orientation. Similarly, high interested participants tend to learn the subject superficially (M = 9.27) more than low interested participants do (M = 7.81). The levels of individual interest have small effect on rote learning in favor of high interest. These results are depicted by Figure 4.6.

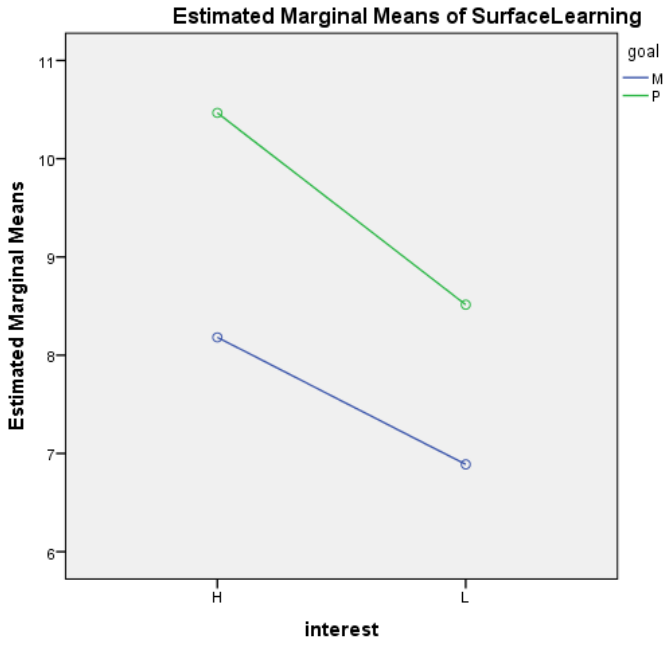

Figure 4.6. Profile Plots

4.2. Results on Meaningful Learning Outcomes

A 2 x 2 ANCOVA was conducted to evaluate the effects of two achievement-goal conditions and individual interest levels on participants' meaningful learning outcomes. The scores participants gained on the pretest of achievement were served

as covariate to control initial content knowledge differences. Prior to conducting the analysis, ANCOVA assumptions were checked and as explained below all the assumptions were met.

Firstly, normality assumption was checked through skewness and kurtosis values on dependent variables and covariate for each cell defined by the independent variables. Skewness and kurtosis values for each cell were between -2 and +2 critical values. Then, Shapiro-Wilk test of normality has also been conducted. The results of this test confirmed that subjects on the dependent variable as well as covariate were normally distributed among various cells defined by the independent variables. Skewness and kurtosis values and Shapiro-Wilk tests results are given in Table 4.1.

Secondly, the homogeneity of variances on dependent variable among the cells was tested by Levene's Test of Equality of Variances. Based on the results of Levene's test, the null hypothesis that the error variance of the dependent variable is equal across groups was retained, F (3, 121) = 0.886, p = 0.451.

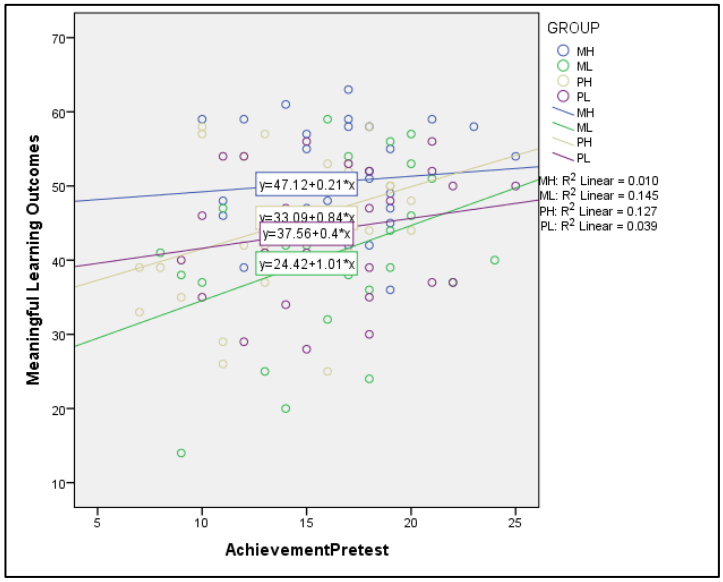

Figure 4.7. Linearity for Meaningful Learning

Then, linearity assumption had been visually checked through scatter-plots and fit lines. As it can be seen form Figure 4.7, there is a linear relationship between the

scores on dependent variable and the covariate scores for each cell defined by independent variables.

Lastly, the homogeneity of regression slopes assumption was tested. Neither 2-way nor 3-way interaction yielded any significant difference. Homogeneity of regression slopes assumption test results are presented in Table 4.4.

Table 4.4. Homogeneity of Regression Slopes for Meaningful Learning

Source	df	F	Sig.	Partial η^2
Achievement-goal*Individual interest	3	1.84	0.14	0.05
Achievement-goal*Achievement posttest	1	0.05	0.98	0.00
Individual Interest*Achievement posttest	1	0.201	0.66	0.00
Achievement-goal *Individual interest*Achievement posttest	1	2.29	0.13	0.02

Note: df is the degrees of freedom; F stands for the F-statistics; and Sig. indicates whether the results are statistically significant considering the given alpha (i.e., significance) level.

As a result, it was concluded that all the assumptions of ANCOVA had been retained. Therefore, we proceeded to conduct 2 x 2 ANCOVA to evaluate the effects of achievement goal orientation and individual interest levels on the participants' meaningful learning outcomes. The descriptive statistics for meaningful learning outcomes are given in Table 4.5.

Table 4.5. Descriptive Statistics of Meaningful Learning Outcomes

Achievement Goals	Interest Levels	N	Mean	SD	Variance
Mastery-goals	High Interest	33	50.52	7.35	54.02
	Low Interest	27	40.81	11.06	122.32
	Total	60	46.15	10.34	106.92
Performance-goals	High Interest	30	45.00	9.27	85.93
	Low Interest	35	44.00	7.81	61.00
	Total	65	44.46	8.46	71.57
Total	High Interest	63	47.89	8.70	75.69

	Low Interest	62	42.61	9.42	88.74
	Total	125	45.27	9.41	88.55

Note: N is the number of participants in each group; and SD is the standard deviation of the scores.

The results for the two-way ANCOVA indicated a significant main effect for individual interest, F (1, 120) = 14.57, p = 0.000, partial $\eta^2 = 0.11$ Cohen's d = 0.70; a nonsignificant effect for achievement goal orientation, F (1, 120) = 0.08, p = 0.769, partial $\eta^2 = 0.00$ Cohen's d = 0.00; and a significant interaction between individual interest and achievement goal orientation, F (1, 120) = 6.01, p = 0.016, partial $\eta^2 = 0.05$ Cohen's d = 0.46. The test results of between subject effects also given in Table 4.6.

Table 4.6. Test of Between Subject Effects: Meaningful Learning

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2198.24[a]	4	549.56	7.51	0.000	0.200
Intercept	8517.78	1	8517.78	116.44	0.000	0.492
Achievement Pretest	695.81	1	695.81	9.51	0.003	0.073
Goals	6.31	1	6.314	0.08	0.769	
Interest	1065.67	1	1065.67	14.57	0.000	0.108
Goals*Interest	439.43	1	439.43	6.01	0.016	0.048
Error	8778.51	120	73.15			
Total	267171.00	125				
Corrected Total	10976.75	124				

Note: df is the degrees of freedom; F stands for the F-statistics; and Sig. indicates whether the results are statistically significant considering the given alpha (i.e., significance) level.

Because the interaction between achievement goal orientation and individual interest was significant, we ignored the individual interest main effect, rather we examined the individual interest simple main effects—that is, the differences between mastery-goal

condition and performance-goal condition separately. To control for Type-1 error across the two simple main effects the Bonferroni correction was employed such that alpha (i.e., significance) level was set to 0.025.

Tests were conducted to evaluate all possible simple effects. Estimated means of high and low individual interest levels for mastery-goal conditions were M = 50.17 and M = 40.47 with confidence intervals of CI = (47.21, 53.13) and CI = (37.20, 43.73), respectively. Estimated means of high and low interest levels for performance-goal conditions were M = 45.92 and M = 43.81 with confidence intervals of CI = (42.77, 49.07) and CI = (40.94, 46.67), respectively.

Firstly, respective statistics of simple main effects of interest of mastery-oriented learners are: F (1, 120) = 19.11, p = 0.000, partial η^2 = 0.14, Cohen's d = 0.80; and these statistics for performance-goal oriented learners are: F (1, 120) = 0.96, p = 0.329, partial η^2 = 0.01, Cohen's d = 0.17. These results are given in Table 4.7 and suggested that there was a significant mean difference on the meaningful learning outcome scores between high interest and low interest for mastery-oriented learners only.

Table 4.7. Univariate Test Results on the Effects of Individual Interest on Meaningful Learning

Goal		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
M	Contrast	1397.942	1	1397.942	19.110	0.000	0.137
	Error	8778.510	120	73.154			
P	Contrast	70.206	1	70.206	0.960	0.329	
	Error	8778.510	120	73.154			

Note: df is the degrees of freedom; F stands for the F-statistics; and Sig. indicates whether the results are statistically significant considering the given alpha (i.e., significance) level.

Table 4.8. Univariate Test Results on the Effects of Goal-Orientation on Meaningful Learning

Interest		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
H	Contrast	274.026	1	274.026	3.746	0.055	0.030
	Error	8778.510	120	73.154			
L	Contrast	169.667	1	169.667	2.319	0.130	
	Error	8778.510	120	73.154			

Note: df is the degrees of freedom; F stands for the F-statistics; and Sig. indicates whether the results are statistically significant considering the given alpha (i.e., significance) level.

Additionally, simple main effects of achievement-goal orientation evaluated within high interested learners, F (1, 120) = 3.76, p = 0.055, partial η^2 = 0.03, Cohen's d = 0.35, and low interested learners, F (1, 120) = 20.32, p = 0.130, partial η^2 = 0.02, Cohen's d = 0.28. These results are given in Table 4.8, which suggests no significant mean difference on the meaningful learning outcome scores observed.

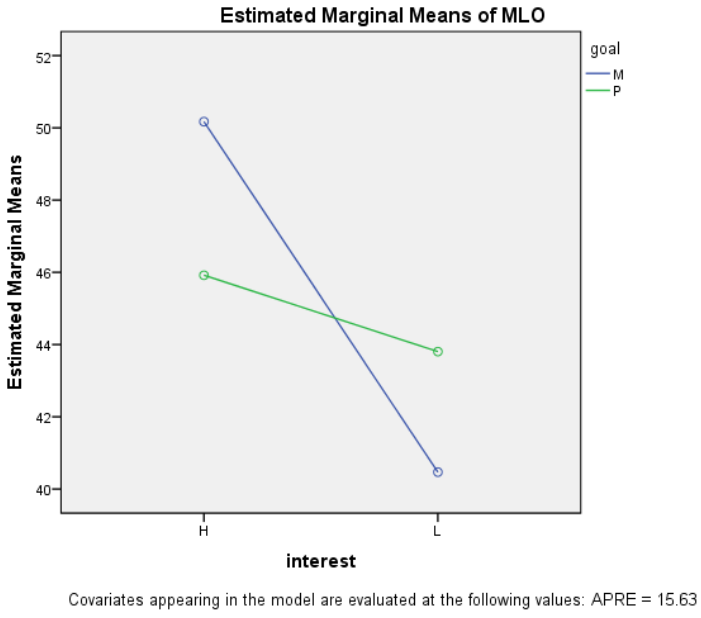

Figure 4.8. Profile Plots: Meaningful Learning

It can be concluded that, within the mastery-goal oriented participants, high interested participants demonstrated significantly higher meaningful learning than low interested participants (Mean Difference = 9.70). Within the mastery-goal oriented learners, individual interest has approximately large effect on meaningful learning outcomes in favor of high interest condition. Yet, an individual interest does not play any significant role on meaningful learning for learners who have performance-oriented achievement goals (Mean Difference = 2.12). These results are depicted by Figure 4.8.

4.3. Results on Worthy Performance

A 2 x 2 ANCOVA was conducted to evaluate the effects of two achievement-goal conditions and interest levels on worthy performance. Achievement posttest scores were used as covariate to control the effects of prior knowledge difference. Preliminary checks had been conducted to make sure the ANCOVA assumptions were met.

Normality assumption was checked through skewness and kurtosis values on dependent variables and covariate for each cell defined by the independent variables first. Skewness and kurtosis values for each cell were between -2 and +2 critical values. Shapiro-Wilk test of normality has also been conducted. The results of this test confirmed that subjects on the dependent variable as well as covariate were normally distributed for all cells. Skewness and kurtosis values and Shapiro-Wilk tests results can be seen in Table 4.1.

For homogeneity of variances assumption on dependent variable among the cells, results of Levene's Test of Equality of Variances had been evaluated. According to Levene's test, the null hypothesis claimed that the error variance of the dependent variable is equal across groups retained, $F(3, 121) = 0.693$, $p = 0.56$. Then, this assumption was also met.

Linearity assumption has been visually checked through scatter-plots and fit lines. As it can be seen in Figure 4.9, there is a linear relationship between independent variable and covariate scores of each group.

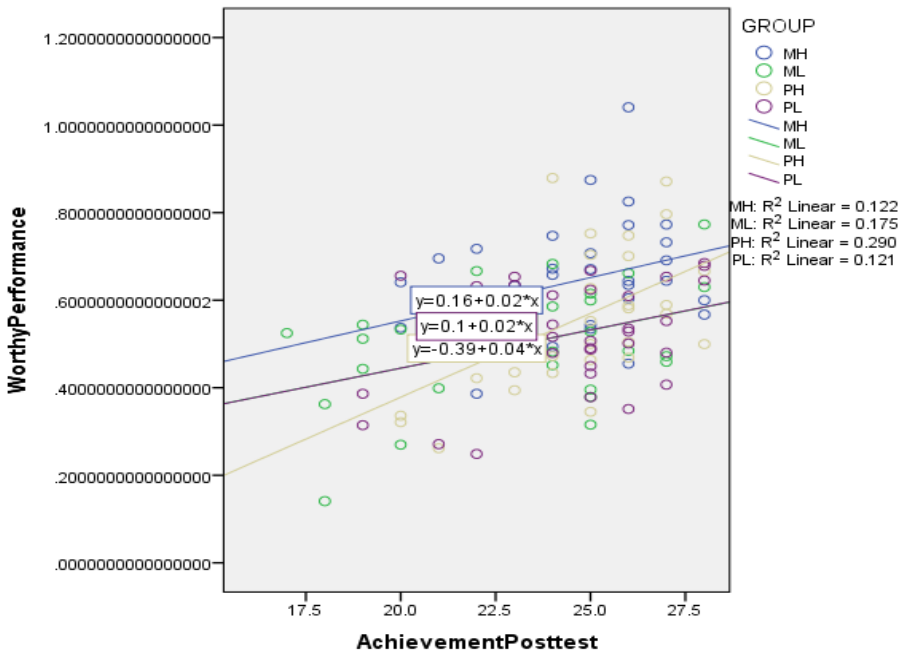

Figure 4.9. Linearity: Worthy Performance

Homogeneity of regression slopes assumption was tested. Neither the 2-way nor 3-way interactions found to be significantly different. Homogeneity of regression slopes assumption test results are presented in Table 4.9. Therefore, it was concluded that all the assumptions needed for conducting ANCOVA had retained. Thus, we proceeded to conduct 2 x 2 ANCOVA to evaluate the main and interaction effects of two achievement-goal conditions and interest levels on the ordinary performance.

Table 4.9. Homogeneity of Regression Slopes: Worthy Performance

Source	df	F	Sig.	Partial η^2
Achievement-goal*Individual interest	3	1.06	0.37	0.03
Achievement-goal*Achievement posttest	1	1.02	0.31	0.01
Individual Interest*Achievement posttest	1	1.06	0.21	0.01
Achievement-goal*Individual interest*Achievement posttest	1	1.00	0.32	0.01

Note: df is the degrees of freedom; F stands for the F-statistics; and Sig. indicates whether the results are statistically significant considering the given alpha (i.e., significance) level.

The group means and standard deviations for worthy performance are presented in Table 4.10.

Table 4.10. Descriptive Statistics of Worthy Performance

Achievement-goal	Interest Level	N Valid	Mean	SD	Variance
Mastery-goal	High Interest	33	0.639	0.132	0.017
	Low Interest	27	0.498	0.138	0.019
	Total	60	0.576	0.151	0.023
Performance-goal	High Interest	30	0.556	0.160	0.026
	Low Interest	35	0.523	0.119	0.014
	Total	65	0.538	0.140	0.020
Total	High Interest	63	0.600	0.151	0.023
	Low Interest	62	0.512	0.127	0.016
	Total		0.556	0.146	0.021

Note: N is the number of participants in each group; and SD is the standard deviation of the scores.

The ANCOVA results, given in Table 4.11, indicated no significant interaction between achievement-goal and interest level, $F(1, 121) = 3.351$, $p = 0.070$, partial $\eta^2 < 0.03$. This indicates that, there is no significant difference in the effect of interest level on worthy performance for mastery and performance-goal oriented learners. Thus, we only reported the simple main effects without any mean adjustments.

Table 4.11. Test of Between Subject Effect: Worthy Performance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	0.736[a]	4	0.184	11.598	0.000	0.279
Intercept	0.001	1	0.001	0.069	0.794	0.001
Achievement Pretest	0.379	1	0.379	23.893	0.000	0.166
Goals	0.068	1	0.068	4.286	0.041	0.034
Interest	.153	1	0.153	9.649	0.002	0.074

Goals*Interest	.053	1	0.053	3.351	0.070
Error	1.905	120	0.016		
Total	41.304	125			
Corrected Total	2.641	124			

Note: df is the degrees of freedom; F stands for the F-statistics; and Sig. indicates whether the results are statistically significant considering the given alpha (i.e., significance) level.

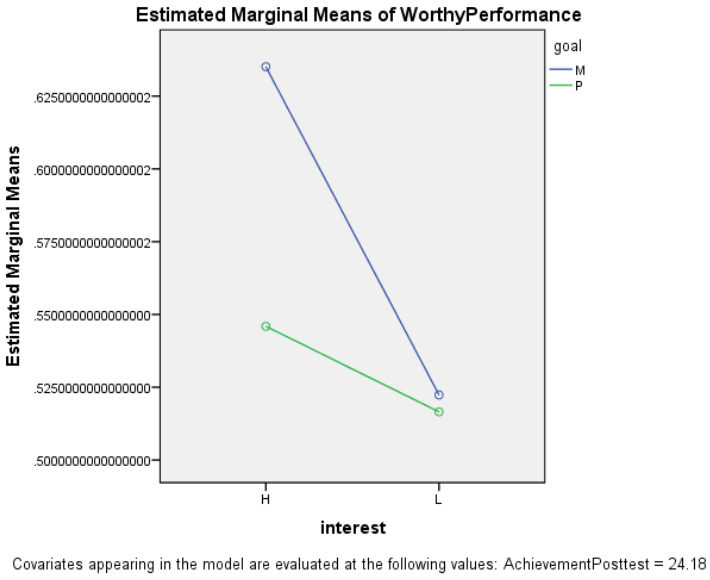

Figure 4.10. Profile Plots: Worthy Performance

A 2 x 2 ANCOVA resulted in a significant main effect for interest levels F (1, 121) = 9.642, p = 0.002, partial η^2 = 0.07, Cohen's d = 0.57. According to ANOVA results, there was also a significant difference on worthy performance between the mastery-goal and performance-goal oriented learners F (1, 121) = 4.286, p = 0.041, partial η^2 =0.03, Cohen's d = 0.38. These results are depicted by Figure 4.10.

4.4. Summary of the Results

Hypotheses testing results based on the ANOVA and ANCOVA results are summarized in Table 4.12. The table provides the p-value of the respective test results, decisions made based on the p-values, and the effect sizes for the significant differences. For the rote learning case, ANOVA results suggested that there is no

significant interaction effect (individual interest*achievement goal) across the groups defined by the level of interest and type achievement goals. Yet, there is a significant different between the two interest levels and two achievement goals in terms of rote learning.

Table 4.12. Summary of Hypothesis Testing Results

Hypotheses		**p-value**	**Decision**	**Effect Size**
Rote learning?				
Interaction effect		0.642	Fail to reject	
Individual Interest		0.024	Reject	d=.42
Achievement Goal		0.007	Reject	d=.50
Meaningful Learning?				
Interaction Effect		0.016	Reject	d=.46
Individual Interest				
	In Mastery	0.000	Reject	d=.80
	In Performance	0.329	Fail to reject	
Achievement Goal				
	In High Interest	0.055	Fail to reject	
	In Low Interest	0.130	Fail to reject	
Worthy Performance?				
Interaction Effect		0.070	Fail to reject	
Individual Interest		0.001	Reject	d=.57
Achievement Goal		0.041	Reject	d=.38

Furthermore, ANCOVA results based on the meaningful learning suggested an interaction effect (individual interest*achievement goal). Therefore, we had to look at simple main effects of interest levels and achievement goals. Results indicated a significant difference in meaningful learning between the groups defined by the interest levels given that their participants have mastery goal orientation; whereas the meaningful learning of two distinct interest groups did not differ significantly when their participants had performance goal orientation. Also, no significant difference observed in terms of meaningful learning when we consider the simple main effects of achievement goals under both high and low interest conditions.

The last analysis (an ANCOVA on worthy performance) was conducted to see whether distinct groups significantly differ in terms of worthy performance. Because

the interaction effect (individual interest*achievement goal) was not significant, we considered main effects of interest levels and achievement goals. Both main effects suggested significant differences such that individuals' worthy performance is affected by their interest levels and achievement goal orientations.

CHAPTER 5

DISCUSSION

The primary goal of this study was to investigate the effects of individual interest and achievement goal orientations on learning and task performance. Existing studies of individual interest have not addressed the interaction effects of between individual interest and achievement-goal orientations. Through this study, we experimentally tested the interaction effects of individual interest and achievement-goal orientation on rote learning, meaningful learning and worthy performance distinctly. The findings ensured that the outcomes, as well as the demands of these two types of learning, were quite different. Highlights from overall findings are as follows:

- Both high individual interest and performance-goal orientation increase rote learning outcomes independently. Achievement-goal orientation plays more effective role than individual interest for the increase in rote learning.
- High individual interest has a potentially large impact on meaningful learning. But, in order to high interest to be effective, the learner must perceive mastery-goal toward learning.
- Both high individual interest and mastery-goal orientation increase worthy performances of individuals independently. Having high-interest in task plays more effective role than having mastery-goal toward completion of a task.

The findings of the study are discussed within the subtopics aligned with the research questions.

5.1. Discussing Increase in Rote Learning

This experiment did not detect any evidence for the interaction effect of individual interest and achievement goal orientation on rote learning. It means that the effect of individual interest on rote learning does not vary due to the achievement-goal

orientation of the students. Likewise, the impact of achievement-goal is independent from students' individual interest levels. Due to the lack of interaction effect of individual interest and achievement-goal orientation on rote learning, the main effects of these independent variables are discussed separately.

On the result of the current study, the participants with high interest gained on the achievement test than the participants with low interest. The findings also ensured that individual interest has a small effect on rote learning. Hereby, this study provided remarkable evidence that having an individual interest toward any activity or topic may contribute to remember and to understand the knowledge relevant to corresponding activity or topic. However, one may argue that even small effect of individual interest on rote learning may lead to a remarkable practical influence on learning if we consider rote learning as a prerequisite for meaningful learning. Because improvement in factual knowledge will eventually increase the probability of processing and then transferring the knowledge into practice. The research findings of Coutinho and Neuman (2008) provided evidence for this view. They concluded that mastery-goal oriented learners use both surface and deep levels of processing whereas performance-goal oriented learners use only surface level processing.

Having individual interest to affect rote learning is one of the expected findings of the current study. On a side note, it provides an empirical evidence for the causal relationship between interest and learning which has been recognized decades ago. Initially, Herbart (1965a; 1965b) emphasized this causal relationship by arguing that interest leads individual toward complete recognition of an object which supports long-term storage of knowledge, meaningful learning, and trigger for further leaning. Then, Piaget (1981) attracted readers' attention to the relationship between affectivity dimension of information procession system and intellectual functioning. Hidi (1990) expended Piaget's view by stating that "one energetic feature of the organism-interest-is central in determining how we select and persist in processing certain types of information in preference to others" (p.549). These are some of the theoretical views

that might be considered as a theoretical base for an expected causal relationship between individual interest and learning.

This finding, indeed, specialized the causal relationship between interest and learning, which are broader concepts, into individual interest and rote learning. Therefore, even if this finding is expected one, it still makes a remarkable contribution to both interest and learning literature. Even though there is a general agreement in the literature about interest being a mental resource for improving learning (see, Ainly et al., 2002; Hidi & Renninger, 2006; Pekrun, 2000), the role of individual interest on rote learning was not clear. This study provided an empirical evidence for the causal relationship between the specific form of interest on a specific form of learning.

According to the findings of the current study, performance-goal oriented students memorize and remember better than mastery-goal oriented students. The size of the effect caused by achievement-goal orientation over the mean difference between experimental groups' rote learning scores was medium. On the basis of this finding, it may be argued that there is a causal relationship between the factors of achievement-goal orientation and rote learning. It means that a person who adapts performance-goal such as participating in top twenty on the achievement test, memorize and understand facts, concepts, and procedures better than a person who adapts mastery-goal such as developing competence on the subject-matter.

This finding of the current study was also expected since the finding fits the theoretical views on learning approaches. Biggs argued that "there is a 'psycho-logic' in how people construe their role in a situation, and in their deciding to do something about it" (1987 p.11). Biggs further argued that if one comes to the conclusion that just passing the exam is sufficient success, then to rote learn factual knowledge which is expected to be covered in the test makes the best sense. On the contrary, if one is interested in mastering a particular subject, expecting him or her to find out almost everything regarding that subject, and try to find out what it all means without worrying about the testing or grading (1987).

This finding is also aligned with the surface learning approach-deep learning approach continuum. It must be noted here that, rote learning is a strategy for a surface approach to learning which aims to balance hardworking and failing whereas meaningful learning is a strategy for deep learning approach which aims to study to develop competence and to actualize interest (see Biggs, 1987). In this respect, it might be argued that there is a perfect match between the motives of surface vs deep learning approaches and the factors of achievement-goal orientation: performance-goal vs mastery-goal.

This finding of the current study is almost fully most consistent with the results of previous studies. There are numerous studies had compared the effects of the achievement-goal orientation on learning. Even if they have not differentiated rote learning and meaningful learning, their findings may be compared to this finding for consistency because most of them used course grades as an indicator of learning. Since course grades are mostly gained via achievement tests, which generally measures rote learning outcomes, it makes sense to compare their findings on learning with the findings of this study on rote learning. Most of these studies found mastery-goals of undergraduate students to be unrelated to their course grades (Barron & Harackiewicz, 2001; Elliot & Church, 1997; Elliot, McGregor, & Gable, 1999). Additionally, Similar studies found course grades to be positively related with performance-goals of undergraduate students (Church, Elliot, & Gable, 2001; Elliot & Church, 1997; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000). There are also few studies that reported inconsistent findings comparing with this finding. For instance, Mattern (2005) reported no effect of performance-goal over rote learning. She further argued that it would be difficult to assert a relationship between goal-orientation and learning without knowing the effects of other constructs such as learning strategies and self-efficacy (2005).

5.2. Discussing Increase in Meaningful Learning

The results of the study revealed a significant interaction effect of individual interest and achievement goal orientation on meaningful learning outcomes. It means that individual interest may affect students' meaningful learning differently due to their perceived achievement-goal types. Likewise, students' achievement-goal orientations may play a different role for high interested students and for low interested students. Due to the interaction between the levels of interest and the factors of achievement-goal orientation, the main effects of each variable on meaningful learning are ignored and simple main effects of them are discussed here.

The interaction effect of individual interest and achievement-goal orientation was an expected finding from a theoretical viewpoint because Marton and Saljo (1976a; 1967b) theorized that students process academic tasks via one or other way. These ways of processing academic tasks are later named by Biggs (1987) as students' approaches to learning: surface approach vs deep approach. In a learning situation, people use surface-level processing if they choose only to exhibit the symptoms of being learned whereas they use deep level processing if they intend to completely understand and extract the maximum meaning of it (Biggs, 1987; Marton & Saljo, 1965a; 1965b). In other saying, in any learning situation, there are at least two types of expectations which are either looking knowledgeable using minimum effort or actualizing the interest on the subject by mastering it. These expectations fit the achievement-goal orientation types. The former expectation resembles the performance-goal orientation whereas the latter resembles mastery-goal orientation. As the theory of Marton and Saljo (1987) suggested, the main reason for intentionally choosing deep level processing, which requires more effort than surface level processing, is to actualize interest. If it is the interest which triggers for meaningful learning, the effect of mastery-goal on meaningful learning may expect to be vary based on the individual interest levels. That is why this finding is expected one.

The results of the study also ensured that individual interest in the learning subject is highly effective if the learner has mastery-goals. The participants who demonstrated high individual interest toward the learning materials eventually performed better on the performance task. The effect of individual interest was estimated as nearly large. This simple main effect of individual interest on meaningful learning within mastery-goal oriented learners is also expected finding. As it was discussed earlier, the motive for meaningful learning is actualizing interest through finding out as much as possible regarding the subject-matter. This motive is akin to the mastery-achievement goal which relies on intrinsic motivation.

The simple main effect of individual interest on meaningful learning outcome within performance-goal oriented groups also evaluated. Data revealed no statistically significant mean score difference between the individual interest levels for performance-goal oriented participants. It means that individual interest does not contribute to meaningful learning outcome if the learner approaches learning situation with performance-goal such as meeting minimum requirements for avoiding failure. The most logical explanation for this finding might be that performance-goal underestimates the constructive effect of individual interest plays on meaningful learning. Being individually interested in a particular subject would enable a person to find out everything about it. This act would probably require a great deal of effort. Conversely, adopting performance-goal is all about exerting minimum effort and avoiding failure. Therefore, one may argue that one who adopts performance-goal may intentionally choose to underperform in order to save time and either physical or cognitive energy for subsequent tasks.

Although there are very limited studies (if any) investigated the interaction effects caused by individual interest and achievement-goal orientation, some other studies which have examined the effects of one or another variable on learning may provide us with insight for the consistency between the finding of this study and existing ones. Durik and Harackiewicz (2007) conducted an experimental study to examine the causal relationship between individual interest and math performance. They reported

that participants in high individual interest condition performed significantly higher than the participants in low individual interest condition. Additionally, a longitudinal study that investigates the causal relationship between interest and academic achievement in math conducted by Koller, Baumert, and Schnabel (2001). The results of their research suggested a reciprocal relationship between interest and math achievement. Moreover, the qualitative study conducted by Kahu, Nelson, and Picton (2017) suggested the student's existing individual interest as a source of better learning.

These are the examples for previously published studies that suggest a significant main effect of interest over learning. Comparing to the findings of these studies with the findings of the current study, one may sense the existence of the consistency between the findings of the current study and the findings of the previously published ones. It must be noted here that the current study also revealed a main effect of individual interest on rote learning whereas revealing a simple main effect of individual interest on meaningful learning within only mastery-goal oriented learners.

5.3. Discussing Increase in Worthy Performance

The current experiment did not reveal any evidence for the interaction effect of individual interest and achievement goal orientation on worthy performance scores. It means that the differences in worthy performance mean scores between high individual interest condition and low individual interest condition do not vary as a function of achievement goal orientation. Therefore, the main effects of individual interest and achievement-goal orientation on worthy performance were safely discussed here.

The findings of the study suggested that the level of individual interest toward subject-matter makes a statistically significant difference on worthy performance mean score gained on the performance task. More precisely, the current study compared the worthy performance mean scores of high individual interest and low individual interest groups, and the result ensured that individual interest made a significant

contribution on the worthy performance scores gained from performance task. The size of the effect was medium. This finding evinced that individual interest plays an important role on either enhancement of performance or deduction of cognitive cost, and maybe on both. Comparing this finding with the findings regarding the effects of individual interest on learning, especially the effect of individual interest on meaningful learning, it sounds reasonable that individual interest improves performance while reducing cognitive cost.

As expected, high individual interest associated with rote learning regardless of achievement goal orientations, and with meaningful learning with regard to mastery-goal orientation. In order to perform higher on any performance task, the participants should have previously been learned task-related knowledge and develop skills required for completion of the task. They first memorize, remember, and understand the factual, conceptual, and procedural knowledge via rote learning. In this phase, individual interest to be expected to enhance rote learning as it was discussed earlier. Moreover, the participants are also expected to analyze ideas, implement knowledge into a new situation, design and create new product and etc. to accomplish given performance tasks. In order to do all these, they must develop certain competence on the subject-matter as well. This can be achieved by learning the task related content meaningfully. From this point of view, individual interest may also be expected to improve task performance.

Besides, there are numerous previously published research papers suggesting the relationship between interest and task persistence, task engagement, self-regulated learning, use of learning strategies, and heightened attention. The common sense in the literature is that interest improves learning and ordinary performance via heightened attention, task engagement, and task persistence. It must be noted here that, interest improves performance as well as task persistence and attention. Therefore, on the one hand, it may be argued that improvement in performance requires a cognitive cost. That is true though. If interest heightens attention to improve performance, allocated working memory capacity corresponding to that certain task should also be

expanded. Moreover, it might be expected that to perform the task better, we need to deplete the more cognitive inner resource, which is a limited mental resource. On the other hand, we need to consider the replenishment effect of interest as well. Literature suggests that an interesting task replenishes the mental resources and plays an essential role on optimization of limited cognitive resources through strategically distributing the available resources (O'Keefe & Linnenbrink-Garcia, 2014; Schank, 1979; Thoman, Smith, & Silvia, 2011; Toker, 2017). Hereby, the effect of interest on ordinary performance and worthy performance may be expected to differ.

This finding of the current study has a consistency with the results of a previously published study of O'Keefe & Linnenbrink-Garcia (2014). O'Keefe & Linnenbrink-Garcia (2014) designed an experimental study to examine the optimization function of individual interest in ordinary performance and on self-regulatory resources. As they expected, the results of their study revealed that high levels of affect- and value-related interest types were associated with the optimization of both uses of self-regulatory resources and performance on the anagram test (O'Keefe & Linnenbrink-Garcia, 2014).

Toker (2017), on the other hand, examined the possible effect of interest on ordinary performance as well as worthy performance. The results of the first study revealed a significant difference on worthy performances between high-interested learning group and low-interested learning group whereas it has not detected any effects of individual interest on ordinary performance. It is noteworthy mentioning that, the study conducted by Toker (2017) demonstrated an important limitation on measuring cognitive effort. He used only one indicator, which is time spent on the task, for estimation of cognitive effort that the participants exerted during the completion of the tasks. This is an important shortcoming due to the fact that his study ignored or fail to measure the optimization effect of interest on the use of cognitive resource and the replenishment effect on the depleted mental resources. This might explain the inconsistency between the results of the current study and the one conducted by Toker (2017).

According to the results of the current study, mastery-goal oriented participants' worthy performance mean score was significantly higher than performance-goal oriented participants' mean score on the performance task. The size of the effect caused by achievement-goal orientation over the mean difference between mastery-goal and performance-goal oriented participants' worthy performance scores was small. On the basis of this finding, one may infer that there is a causal relationship between the factors of achievement-goal orientation and worthy performance. More specifically, the person, who adapts mastery-goals toward completion of performance tasks, gains significantly higher worthy performance score than the person who perceives performance-goal toward completion of a task. For instance, if a person aims to perform a task in order to meet the minimum requirements for avoiding failure, s/he will be expected to underperform for the intention of saving energy. Even if s/he demonstrates high performance, the cognitive cost of the performance will probably be higher than the one who demonstrates very same performance with mastery-goals.

In achievement-goal literature, there are very limited studies (if any) exists in which the effects of academic-goal orientation on worthy performance has been investigated. However, we already know that achievement-goal orientation affects students' task engagements (Dweck & Leggett, 1988), use of learning strategies (Somuncuoglu & Yıldırım, 1999), and task persistence (Ames, 1992). Furthermore, mastery-goal leads students to engage more, to persist more on the task, and to apply more effective learning strategies such as cognitive, meta-cognitive, and problem-solving. These are sufficient reasons that we expect the student who adopts mastery-goal while performing a task to be more successful than the student who adopts performance-goal to perform the same task. Relied on theoretical evidence in the literature and the empirical evidence provided in the current study, it is clear that, mastery-goal orientation and individual interest increase worthy performance in any learning situation by taking different paths. Mastery-goal increases the numerator part of the worthy performance formula suggested by Gilbert (2007), whereas high individual interest reduces the denominator part of the same formula. Remember that worthy

performance (WP) is the ratio of valuable accomplishment (A) to costly behavior (B) (Gilbert, 2007). Mathematical demonstration of the formula is WP=A/B.

5.4. Educational Implications

The present study is designed to examine possible effects of individual interest and academic-goal orientation on undergraduate students' rote learning, meaningful learning, and worthy performance under the control of prior knowledge related to subject-matter that they learn. The results provided empirical evidence that high individual interest toward subject-matter allows students to memorize, to remember, and to understand (these are the features of rote learning) the factual, conceptual, and procedural knowledge and to recall that knowledge when needed. Achievement-goal orientation is also found to be significantly related to rote learning of factual, conceptual, and procedural knowledge. The study revealed that student with performance-goal is more successful in rote learning.

It can be inferred from the results of the study that there are two distinct ways of improving students' rote learning outcomes. The first way is to improve students' individual interest on the subject-matter and the second way is to enable students to adopt or to assign them with performance-goals directly. The latter way is easier than the former way because we can push students toward performance-goal by setting norm-referenced achievement criteria. It probably works perfectly fine. As a matter of fact, when we compare the effectiveness of individual interest and achievement-goal orientation on rote learning using effect sizes, the comparison revealed that the factors of achievement-goal orientation affect rote learning more than the levels of individual interest.

Nonetheless, we may still need our students to have high individual interest to increase their rote learning outcomes. In such circumstances, it can be used situational interest because of two main reasons. The first reason is expecting situational interest to have a similar effect on rote learning that individual interest does. Indeed, this would be a long-shot due to the fact that situational interest is a relatively transient reaction to a

certain subject or activity in an immediate environment. The second and also more logical reason for enhancing students' situational interest, which can easily be manipulated, is the notion that situational interest in a certain subject may eventually develop an individual interest (Palmer, Dixon, & Archer, 2017).

Another important finding revealed by the current study is the interaction effect of individual interest and achievement-goal orientation on meaningful learning. Simple main effect analyses revealed that the levels of individual interest affect the meaningful learning within only mastery-goal oriented groups. This finding provided an evidence that the motivational requirement for rote learning and meaningful learning is different; because, the levels of individual interest and the factors of achievement-goal play different roles on the outcomes of these two distinct learning approaches. One may make an inference from this finding that mastery-goal orientation is a prerequisite for high individual interest to be effective on meaningful learning outcome of the students. Otherwise, performance-goal may underestimate the effect of individual interest.

On the basis of this argument, if we demand our students to demonstrate competence in the certain subject, first, we should ensure that they perceive a mastery-goal toward a subject-matter. Thus, they would persist on the challenging learning tasks, engage in learning through effective learning strategies such as problem-solving, and eventually build competence in the subject. However, they will probably do all these in order to actualize their interest in the subject. That might be the reason why individual interest levels matter for mastery-goal oriented learners to demonstrate meaningful learning. If the students initially are not interested in the subject, we should design instruction in an interesting way to create situational interest in the subject which will eventually heighten an individual interest.

By heightening student's individual interest and pushing them toward adoption of mastery-goal, we may increase the probability of meaningful learning to occur. Nonetheless, we should be careful about doing it. As we discussed earlier, developing

competence in a certain subject requires greater effort (i.e., enhanced persistence, more complex cognitive processes) rather than simply memorization of the facts regarding particular subject. For this reason, before we demand our students to become fully competent on the certain subject, we need to ask ourselves the following question first: Does it worthy my students to spend extra energy to learn this content meaningfully rather than simply memorizing the factual knowledge regarding that subject?

If the answer is yes, there are two subsequent questions to answer. First, how shall I design the instruction to enable the students to perceive mastery-goal? Because the results of the current study suggested that mastery-goal oriented learners demonstrated higher meaningful learning. If the answer is no, then we should lead them to rote learning of the content by setting up the achievement criteria aligned with performance-goal. Hereby, we can allow our students to save cognitive resources for the subsequent task. For example, we may ask ourselves that is it right to expect medical school students to learn history lesson meaningfully, which is a compulsory course in every department of any university in Tukey. If we come to the conclusion that learning history meaningfully does not make them better doctors, we may rather ask them to memorize the historical facts for avoiding failure. Thus, this attitude of teachers may leave the students a more cognitive resource that they will probably need while they meaningfully learn major area course such as anatomy which makes him a better doctor.

Even in this position, we ask ourselves how can I enhance my student's individual interest toward the subject (i.e., anatomy in this case) since enhancing students' individual interest is crucial for reducing cognitive cost during meaningful learning. Answering these questions before designing any instruction or learning assignments optimize the performance and used cognitive effort, which refers to improvement in worthy performance. Depending on the results of the current study, we can argue that teachers, instructional designers, and educational policymakers have the power to optimize students' worthy performances through orienting students' achievement-

goals, enhancing their individual interest levels, and small changes on educational policies.

Even small changes in a weekly course timetable may lead a greater improvement on worthy performances of the entire classroom. Consider this example, starting a day with more interesting lessons such as music or physical education leaves a greater amount of cognitive resources that might be needed for subsequent lessons, because individual interest has a function to optimize expenditure of cognitive resources, and positive mood replenishes limited cognitive resources. On the contrary, starting a day with the most challenging lessons such as math will probably consume most of the limited cognitive resources that students have. It would probably cause students to underperform on subsequent lessons.

5.4.1. Recommendations on Pre-service Teacher Education

To transfer what learned in the classroom into workplace, learned concepts should properly be linked to each other, otherwise, learners face lots of problems such as reasoning, problem-solving, and making inference in workplaces even if they already memorize the factual and conceptual knowledge offered in the classrooms (Khan, Iqbal, & Hashmi, 2007; Novak, 1998). Proper organization of knowledge structure enhances meaningful learning whereas having difficulty to relate a new concept with the existing knowledge leads rote memorization (Khan, Iqbal, & Hashmi, 2007; Novak, 1998). Schools are the workplace for teachers where they educate our youths. Therefore, teachers should be fully developed and competent in order to provide a better education. To raise fully developed and competent teachers, teacher educators ensure that pre-service teachers learn content offered in the college of education meaningfully.

According to the findings of the current study, perceived mastery-goal and high-level individual interest facilitate meaningful learning. Approaching learning with mastery-goals requires more cognitive effort as it was discussed earlier. In this regard, pre-service teacher educators should aim (1) to encourage their students to adopt mastery-

goal toward subject matters and learning tasks (2) to increase their individual interest in subject matters and learning tasks, and (3) to optimize pre-service teachers' exertion of cognitive efforts. Execution of these goals might seem challenging; however, these can be achieved in various ways.

To encourage pre-service teachers to master the subjects covered in the curriculum and to accomplish given learning tasks, the suggestions drawn from psychological theory and research by Svinicki (2010) might be applied. Those suggestions of Svinicki (2010) for fostering mastery goal are summarized below:

1. Giving pre-service teachers choices enhances motivation and reduces anxiety. Thus, it increases the probability of pre-service teachers to adopt mastery-goal. This suggestion of Svinicki relies on self-determination theory suggested by Deci and Ryan (1985).
2. To model mastery approach is another way of encouraging pre-service teachers to adopt mastery-goal. Svinicki (2010) grounds this suggestion on social learning theory suggested by Bandura (1985). She argued that, if the instructors model a mastery-goal orientation, pre-service teachers probably adopt it (2010).
3. Instructors should emphasize learning from mistakes and provide pre-service teachers with opportunities where they can correct their mistakes and learn from those mistakes.
4. To direct pre-service teachers' attention toward learning tasks, instructors should provide them with positive and diagnostic feedback. In this regard, instructors should not merely point out what is wrong or missing, he or she also provides feedback that contains suggestions to make it better. After positive feedback, instructors should also compare the performances before and after the feedback and emphasize the improvement.
5. Relying on the goal-orientation theory, Svinicki (2010) argued that the criteria for success should be clear and not comparative. Instructors shall not compare the performance of one student with the performance of another student.

Rather, instructors should compare the performances of students with their own previous performances. Thus, students to be able to focus on their own performances rather than others.

6. Instructors should make sure that "students perceive others in the class as resources and supporters rather than competitors" (Svinicki, 2010, p. 27). It can be achieved through (1) offering group assignments to encourage students to get to know and to help each other, (2) calling them with their names and knowing something about them, (3) building shared history with the entire class, and (4) being respectful to students and encourage them to treat each other and their instructors with respect.

Due to the interaction effect of achievement-goal orientation and individual interest revealed by the current study, instructors make also sure that pre-service teachers must personally be interested in the subject matters and learning tasks. Their lack of interest may invalidate their mastery-goal orientation. Furthermore, having an individual interest in learning task or activity reduces the use of cognitive resources. Yet, as it was discussed earlier, it is highly challenging to manipulate one's individual interest level, however, instructors can increase pre-service teachers' situational interest by manipulating environmental factors which leads individual interest to increase. Teacher educators may enhance their pre-service teachers' situational interest levels by giving meaningful choices within learning situation, using well-organized, vivid, and relevant text, encouraging students to be active in the classroom, and providing relevant cues before reading (i.e., Schraw, Flowerday, and Lehman, 2001). Beside increased interest, using teaching techniques that include instant feedback mechanisms (i.e., micro-teaching) and reducing cognitive load during pre-service teacher training may reduce the cognitive cost of pre-service teachers in a meaningful learning situation. Thus, both the probability of the occurrence of meaningful learning and the pre-service teachers' worthy performances increase.

Since the 1960s, the micro-teaching technique has been successfully used in teacher education (Kılıç, 2010). It improves both the instructors and pre-service teachers'

performances in the classrooms where the teacher training takes place. Micro-teaching is the teaching technique where the teacher candidate teaches a small part of the lesson to a small group under the supervision of his instructor (Kılıç, 2010). Through micro-teaching, pre-service teachers become aware of teachers' behaviors (Sadler & Cooper, 1972), improve their pedagogical skills (Beetner & Johnson), evaluate and improve their own teaching performance (Darwish & Sadeqi, 2016). There are other advantages of micro-teaching such as choosing, teaching goal, developing skills in drawing attention, managing classroom, preparing lesson plans, choosing proper in-class activities, and so on (i.e., Kılıç, 2010). Micro-teaching enhances teacher candidate's performance on building skills and becoming competent, however, as the current study emphasized, the behavioral cost cannot be ruled out while evaluating the performance. Fortunately, micro-teaching technique minimize the behavioral cost in learning by reducing the complexities of a normal classroom.

It may be argued that micro teaching reduces the cognitive effort of both instructors and pre-service teachers in teacher training. According to Allen and Ryan (1969), micro-teaching techniques scale down the complexities that normal classrooms have and provides teacher candidates with extensive feedback on their own teaching performance (Darwish & Sadeqi, 2016). By its very nature, micro teaching technique reduces down the class size to 5-10 students, limits the duration of each class section to 10 minutes, reduces down the topics and requires to focus on one teaching the skill at a time (Choudhary, Choudhary & Malik, 2013). All these characteristics of micro-teaching refrain pre-service teachers from the complexities of classrooms utilized other teaching techniques. In each micro-teaching sections, teacher candidates receive constructive instant feedback from their instructors. Along with other characteristics, the powerful feedback mechanism turns micro-teaching into an efficient device for teacher training because it focuses on meaningful learning and efficiency.

Meaningful learning occurs when a person mentally integrates new information with prior knowledge which requires cognitive processing. According to empirical evidence provided in the literature, high cognitive load (i.e., large amount of

information that takes remarkable space of limited working memory capacity) is detrimental to learning efficiency (Kuldas, Satyen, Ismail, & Hashim, 2014; Sweller, Ayres, & Kalyuga, 2011) since working memory capacity is limited. In order meaningful learning to be efficient, such cognitive load should be controlled. Cognitive load theory (see Sweller, 2010) suggest that cognitive load occurs either intrinsically or extrinsically. The former is related to the natural complexity of learning a task or the information itself whereas the latter is related to instructional design (Kuldas, Satyen, Ismail, & Hashim, 2014). Both intrinsic and extrinsic cognitive load should also be considered in pre-service teacher education for teacher students to master the content efficiently.

To reduce the intrinsic cognitive load, prior knowledge of pre-service teachers should be considered. Both lower and higher levels of prior knowledge may hamper the learning process (Pass, Van Merriënboer, 1994), therefore, instructors to conduct learner analyses before creating course content for pre-service teachers is important. After deciding what to teach, instructors should focus on how to teach that content inan efficient way. For instance, instructors should present information to pre-service teachers in a way that decreases cognitive load. The best way to do it might rely on concise writing and applying multimedia design principles (see Mayer & Moreno, 1998) while designing multimedia presentations.

To avoid extraneous cognitive load, instructional procedures and teaching techniques should be chosen carefully because the effective technique for an experienced pre-service teacher may be detrimental for novice ones. They may choose instructional methods in which the cognition is distributed across the objects, individuals, and technological tools. Hereby, they may achieve to avoid cognitive load on pre-service teachers as the distributed cognition theory suggested (see, Hutchins, 1995).

Technology integration can also increase efficiency in the pre-service teacher education classrooms by reducing the extraneous cognitive load. For instance; animation can reduce the cognitive cost of mental simulation which allows students

to save cognitive resources for learning tasks (Betancourt, as it cited in Mohamad Ali, 2013). In pre-service teacher education, applying other commonly mentioned strategies in the literature for reduction of cognitive effort (i.e., scaffolding, use of cognitive aids) may also be useful for effective as well as efficient.

In summary, on the basis of the results revealed in the current study and extensive literature review, teacher educators are highly recommended;

- To foster pre-service teachers' mastery-goal orientations in the courses in which they develop teaching skills and competency
- To enhance pre-service teachers' individual interests in subject matters and related learning activities by increasing situational interests of them
- To realize the distinction between the ordinary and worthy performance of learning
- To beware of the human cognitive resource is limited and meaningful learning requires more cognitive resource than rote learning does
- To challenge pre-service teachers with tasks that lead to meaningful learning if the content worth (i.e., contributes to becoming a competent teacher)
- To encourage or allows the pre-service teacher to rote learn the content if it does not contribute to teaching skill development to make them save cognitive effort for learning more important contents and building teaching-related skills
- To optimize the learning performance and cognitive cost of learning behavior by applying the suggestions provided above.

5.5. Limitations and Further Study

The study described here has six noteworthy limitations:

First, 3rd and 4th undergraduate students participated in the current study. The participants of the study were from the department of Childhood Education at Burdur Mehmet Akif Ersoy University Educational Faculty, Turkey. Therefore, the results of the study may not be generalized across other age groups.

Second, the findings of the current study had relied on participants' responses to self-report instruments which are used to measure their individual interest and achievement-goal orientations. The comparison groups are formed based on the responses that the participants provided via these self-report instruments. It might be more reliable to design, develop and apply qualitative data collection procedures rather than self-report measures to validate the experiment groups are accurately defined by individual interest and achievement-goal orientation.

Third, the current quasi-experimental study was conducted over a four-week course and one-week laboratory experiments period. This length of time might be a good start to examine the effects of individual interest and achievement-goal orientation on learning outcomes and performance, it would be useful to expand the length of course period in order to strengthen each achievement-goal orientation by outlasting manipulations. Nevertheless, four-week length manipulation is still better than one-shot laboratory experiments commonly conducted in the interest research field.

Fourth, the quasi-experimental study was conducted without control groups due to time and human resource limitations. Therefore, the study conducted as 2x2 factorial design otherwise 3x3 factorial design including control groups might provide stronger evidence toward the validity of the findings.

Fifth, even though every attempt was made to stabilize the reachability distance of mouse during the measure of both baseline and main task RT, some participants might have put their hands next to the mouse to click as soon as they hear the signal. Each and every participant had been instructed regarding primary and secondary tasks in details including exact location where their dominant hands would be located during baseline RT measuring section.

Sixth, while measuring worthy performance, the only cognitive cost is considered as a behavioral cost. This might be another limitation for the current study.

To further examine the effects of achievement-goal orientation and individual interest on ordinary and worthy performance, I strongly recommend subdividing individual

interest groups into high vs low affect and value valences and using control group for achievement-goal orientation if human resource allows. In order to manipulation work better, the length of the course should also be longer than four weeks. Hereby, the research reveals effects of each valences of individual interest. It also enables researcher to compare each achievement-goal orientation with lack of goal situation.

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APPENDICES

A. INDIVIDUAL INTEREST SCALE (TASK VALUE DIMENSION OF MSLQ)

Değerli Öğrenci,

Bu ölçek *Çevrimiçi Bilgi Arama ve Raporlama* dersine olan bireysel ilgi düzeyinizi belirlemek amacıyla hazırlanmıştır. Ölçekte yer alan sorulara verdiğiniz yanıtlar, kesinlikle **size not vermek** ya da sizi **eleştirmek** amacıyla **kullanılmayacaktır**. Bu soruların herkes için geçerli **doğru yanıtları bulunmamaktadır**. Bu nedenle lütfen aşağıda verilen tüm soruları dikkatle okuyarak yanıtınızı, ifadenin karşısındaki seçeneklerden sizin için en uygun olanı işaretleyerek belirtiniz.

Soruları yanıtlamak için aşağıdaki ölçütleri kullanın. Soruda geçen ifade sizin için **kesinlikle doğru ise (7)**'yi; sizinle ilgili **kesinlikle yanlışsa (1)**'i işaretleyin. Eğer ifadenin size göre doğruluğu bunlardan farklı ise sizin için en uygun düzeyi gösteren (1)'le (7) arasındaki rakamı işaretleyin.

DEMOGRAFİK ÖZELLİKLER

Adınız Soyadınız		Sınıfınız:	
Yaşınız:		Bölümünüz:	
Cinsiyetiniz	☐ ERKEK	☐ KADIN	

Benim için Kesinlikle Yanlış.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Benim için Kesinlikle Doğru.**

BİREYSEL İLGİ

Soru No		
1	Çevrimiçi bilgi arama ve raporlama dersinde öğrendiklerimi diğer derslerde de kullanabilirim.	(1) (2) (3) (4) (5) (6) (7)
2	Çevrimiçi bilgi arama ve raporlama dersinde verilen kaynakları (kaynak materyalleri) öğrenmek benim için önemlidir.	(1) (2) (3) (4) (5) (6) (7)
3	Çevrimiçi bilgi arama ve raporlama dersiyle ilgili konulara oldukça ilgi duyuyorum.	(1) (2) (3) (4) (5) (6) (7)
4	Bence Çevrimiçi bilgi arama ve raporlama dersinde kullanılan materyaller dersi öğrenmem için faydalıdır.	(1) (2) (3) (4) (5) (6) (7)
5	Çevrimiçi bilgi arama ve raporlama dersinin konularını seviyorum.	(1) (2) (3) (4) (5) (6) (7)
6	Çevrimiçi bilgi arama ve raporlama dersinin konularını öğrenmek benim için çok önemlidir.	(1) (2) (3) (4) (5) (6) (7)

B. ACHIEVEMENT-GOAL ORIENTATION SCALES (INTRINSIC-GOAL AND EXTRINSIC-GOAL DIMENSIONS OF MSLQ)

Değerli Öğrenci,

Bu ölçek *Çevrimiçi Bilgi Arama ve Raporlama* dersi hedef yönelimlerinizi belirlemek amacıyla hazırlanmıştır. Ölçekte yer alan sorulara verdiğiniz yanıtlar, kesinlikle **size not vermek** ya da sizi **eleştirmek** amacıyla **kullanılmayacaktır**. Bu soruların herkes için geçerli **doğru yanıtları bulunmamaktadır**. Bu nedenle lütfen aşağıda verilen tüm soruları dikkatle okuyarak yanıtınızı, ifadenin karşısındaki seçeneklerden sizin için en uygun olanı işaretleyerek belirtiniz.

Soruları yanıtlamak için aşağıdaki ölçütleri kullanın. Soruda geçen ifade sizin için **kesinlikle doğru ise (7)**'yi; sizinle ilgili **kesinlikle yanlışsa (1)**'i işaretleyin. Eğer ifadenin size göre doğruluğu bunlardan farklı ise sizin için en uygun düzeyi gösteren (1)'le (7) arasındaki rakamı işaretleyin.

DEMOGRAFİK ÖZELLİKLER

Adınız Soyadınız:	Sınıfınız:
Yaşınız:	Bölümünüz:
Cinsiyetiniz ☐ ERKEK ☐ KADIN	

Benim için Kesinlikle Yanlış. **1 2 3 4 5 6 7** **Benim için Kesinlikle Doğru.**

HEDEF DÜZENLEME

Soru No		
1	Çevrimiçi Bilgi Arama ve Raporlama dersinde beni gerçekten çalışmaya zorlayacağına inandığım ders materyallerini tercih ederim, bu sayede yeni şeyler öğrenebilirim.	(1) (2) (3) (4) (5) (6) (7)
2	Çevrimiçi Bilgi Arama ve Raporlama dersinde, zor olsalar bile, bende merak uyandıran ders materyallerini tercih ederim.	(1) (2) (3) (4) (5) (6) (7)
3	Çevrimiçi Bilgi Arama ve Raporlama dersinde benim için en tatmin edici şey içeriği mümkün olduğunca çok anlayabilmektir.	(1) (2) (3) (4) (5) (6) (7)
4	Eğer olanak tanınırsa, iyi not almamı sağlamayacak olsa bile en iyi şekilde öğrenmemi sağlayacak ödevleri seçerim.	(1) (2) (3) (4) (5) (6) (7)
5	Benim için en tatmin edici şey sınıfta iyi bir not almaktır.	(1) (2) (3) (4) (5) (6) (7)
6	Çevrimiçi Bilgi Arama ve Raporlama dersinde benim için en önemli şey, genel not ortalamamı yükseltmektir, yani bu dersteki asıl amacım iyi bir not almaktır.	(1) (2) (3) (4) (5) (6) (7)
7	Eğer yapabilirsem, bu sınıftaki diğer öğrencilerin hepsinden daha yüksek not almak isterim.	(1) (2) (3) (4) (5) (6) (7)
8	Sınıfta başarılı olmak isterim; çünkü yeteneğimi aileme, arkadaşlarıma, üstlerime ve diğerlerine göstermek benim için önemlidir.	(1) (2) (3) (4) (5) (6) (7)

C. INFORMED CONSENT FORM

ARAŞTIRMAYA GÖNÜLLÜ KATILIM FORMU

Bu araştırma, ODTÜ doktora öğrencisi ve Mehmet Akif Ersoy Üniversitesi araştırma görevlilerinden Tuncer AKBAY tarafından ve ODTÜ öğretim üyelerinden Prof. Dr. İ. Soner YILDIRIM danışmanlığında yürütülmektedir. Bu form sizi araştırma koşulları hakkında bilgilendirmek amacıyla hazırlanmıştır.

Çalışmanın Amacı

Çalışmanın amacı öğrencilerin verilen göreve olan bireysel ilgilerinin ve görevi gerçekleştirmedeki hedeflerinin öğrenme ve performans çıktılarına olan etkisini araştırmaktır.

Bize Nasıl Yardımcı Olmanızı İsteyeceğiz?

Araştırmaya katılmayı kabul etmeniz durumunda, çevrimiçi bilgi arama ve raporlama konularında 8 saat ders alacaksınız. Dersi almadan önce ve aldıktan sonra ders içeriğiyle ilgili bir başarı testi (çoktan seçmeli kâğıt-kalem testi) ile bireysel ilgi ve hedef düzenleme ölçeklerindeki soruları cevaplamanız istenecektir. Bu testleri cevaplamanız toplam 1 saat sürmesi beklenmektedir. Ayrıca 8 saatlik öğretim tamamlandığında öğrendiğiniz konu ile ilgili bilgisayar uygulamalı bir performans görevi yapmanız istenecektir. Bu görevi tamamlamanız yaklaşık 1-3 saat arası zamanınızı alacaktır.

Sizden Toplanan Bilgileri Nasıl Kullanacağız?

Tamamen gönüllülük esasına dayanan bu çalışmada toplanan veriler gizli tutulacak olup araştırmacılar ulaşabilecektir. Katılımcılardan elde edilen veriler toplu olarak değerlendirilecek olup verilerin analiziyle ortaya çıkacak olan araştırma sonuçları sadece bilimsel amaçlı kullanılacaktır (tez ve bilimsel yayın gibi).

Katılımınızla ilgili bilmeniz gerekenler

Katılımcılara uygulanacak olan ölçekler ve başarı testleri kesinlikle kişisel rahatsızlık verecek maddeler içermeyecektir. Bilgisayar temelli performans testi sizi çok zorlayacak veya rahatsız edecek performans görevleri içermemektedir. Yine de çalışmanın herhangi bir aşamasında çalışmadan çıkmak isterseniz çalışmadan ayrılmakta özgürsünüz. Uygulamanın yapılacağı dersler için bu derslere giren hocalarınızın da uygun görmesi durumunda, hocalarınızın belirleyeceği oranda katılımcılara bonus puan verilmesi değerlendirilecektir.

Detaylı bilgi

Çalışmayla ilgili daha fazla bilgi almak veya soru sormak için Mehmet Akif Ersoy Üniversitesi araştırma görevlilerinden Tuncer AKBAY' (e-posta: tuncerakbay@mehmetakif.edu.tr) ile iletişime geçebilirsiniz.

Çalışmaya vermiş olduğunuz katkılardan dolayı teşekkür ederiz.

Yukarıdaki bilgileri okudum ve bu çalışmaya tamamen gönüllü olarak katılıyorum.

(Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

Ad Soyad Tarih İmza

05/02/2018

D. ETHIC COMMITTEE PERMISSION FORM

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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Sayı: 28620816 / 240

05 NİSAN 2018

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Prof.Dr. İbrahim Soner YILDIRIM

Danışmanlığını yaptığınız doktora öğrencisi Tuncer AKBAY'ın ***"Bireysel İlgi ve Hedef Düzenlemenin Performansa ve Etkin Performansa Etkisinin İncelenmesi"*** başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay **2018-EGT-040** protokol numarası ile **06.04.2018 - 30.09.2018** tarihleri arasında geçerli olmak üzere verilmiştir.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Ş. Halil TURAN
Başkan V

Prof. Dr. Ayhan SOL
Üye

Prof. Dr. Ayhan Gürbüz DEMİR
Üye

Doç. Dr. Yaşar KONDAKÇI
Üye

Doç. Dr. Zana ÇITAK
Üye

Doç. Dr. Emre SELÇUK
Üye

Dr. Öğr. Üyesi Pınar KAYGAN
Üye

E. ORGANIZATION CONSENT LETTER-1

Evrak Tarih ve Sayısı: 01/03/2018-E.11140

T.C.
MEHMET AKİF ERSOY ÜNİVERSİTESİ
Temel Eğitim Bölüm Başkanlığı

Sayı : 60938789-200-E.11140 01/03/2018
Konu : Araştırma izni

EĞİTİM FAKÜLTESİ DEKANLIĞINA

Fakültemiz Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü öğretim elemanı Arş. Gör. Tuncer AKBAY'ın, doktora tez çalışması uygulamasını 20 Mart- 04 Nisan 2018 tarihleri arasında Bölümünüz Okul Öncesi Eğitimi Anabilim Dalı 3 ve 4. Sınıf (N.Ö-İ.Ö) Araştırma Projesi II (Yrd. Doç. Dr. Aylin SOP) ve Bilimsel Araştırma Yöntemleri (Yrd. Doç. Dr. Lokman AKBAY) derslerinde uygulama yapmak isteği ile ilgili dilekçesi yazımız ekinde sunulmuştur. Konu ile ilgili Anabilim Dalı görüşümüz uygundur.

Bilgilerinizi ve gereğini arz ederim

Prof. Dr. Ekber TOMUL
Bölüm Başkanı

Ek:1

F. ORGANIZATION CONSENT LETTER-2

Evrak Tarih ve Sayısı: 04/03/2018-E.11642

T.C.
MEHMET AKİF ERSOY ÜNİVERSİTESİ
Eğitim Fakültesi Dekanlığı

Sayı : 52793143-100-E.11642 04/03/2018
Konu : Araştırma Uygulama İzni (Arş.Gör. Tuncer AKBAY)

BİLGİSAYAR VE ÖĞRETİM TEKNOLOJİLERİ EĞİTİMİ BÖLÜM BAŞKANLIĞINA

İlgi : 16/02/2018 tarihli, 8464 sayılı ve "Araştırma Uygulama İzni (Arş.Gör. Tuncer AKBAY)" konulu yazı

Bölümünüz öğretim elemanı Arş. Gör. Tuncer AKBAY'ın, 20 Mart- 04 Nisan 2018 tarihleri arasında Temel Eğitim Bölümü Okul Öncesi Eğitimi Anabilim Dalı 3 ve 4. Sınıf (N.Ö-İ.Ö) öğrencilerine Araştırma Projesi II ve Bilimsel Araştırma Yöntemleri derslerinde doktora tez çalışması uygulamasının yapılması ile ilgili Okul Öncesi Eğitimi Anabilim Dalı Başkanlığı görüş yazısı ekte gönderilmiştir.

Bilgilerinizi ve gereğini rica ederim.

Prof. Dr. Perihan ÜNÜVAR
Dekan Yardımcısı

Ek:Yazı

G. EXPERT REVIEW FORM

Sayın Hocam,

Ekte sunulan test maddeleri için görüşlerinizi aşağıdaki tablodaki uygun seçeneği işaretleyerek cevaplamanız istenmektedir. Katkılarınız için teşekkür ederiz.

Uzman Görüşü verenin;

Unvanı: Alanı:

Adı-Soyadı: İmza:

	Madde Özelliği temsil ediyor.	Maddenin biraz düzeltilmeye ihtiyacı var.	Maddenin oldukça düzeltilmeye ihtiyacı var.	Madde Özelliği temsil etmiyor.	
1					Çevrimiçi Bilgi Arama Sistemleri Temel Kavramları
2					
3					
4					
5					Mantıksal Operatörler
6					
7					
8					
9					Google Filtreleri
10					
11					Bilgi Kaynağı Değerlendirme
12					
13					
14					
15					Bilgi Okuryazarlığı
16					
17					
18					
19					Metin Yapıları
20					
21					
22					
23					İntihal
24					
25					Kanıt Gösterme (Atıf)
26					
27					
28					
29					
30					
31					Kaynakça Yazma
32					
33					
34					

Ek: Bilgi Arama ve Raporlama Testi

H. ACHIEVEMENT TEST

Çevrimiçi Bilgi Arama ve Raporlama Testi

Adı-Soyadı: Bölümü:

Öğrenci Numarası: Sınıfı:

Açıklama: Bu test 'Çevrimiçi Bilgi Arama ve Raporlama' konusunda bilgilerinizi ölçmek amacıyla geliştirilmiştir. Her sorunun tek bir doğru seçeneği vardır. Test süresi 35 dakikadır. BAŞARILAR DİLERİM

Kullanıcıların internet sunucuları ağında (World Wide Web) yer alan kaynakları görüntülemesine yarayan yazılımların genel adı aşağıdakilerden hangisidir?

A) URL B) İnternet Tarayıcısı C) Bilgisayar D) Köprü E) Arama Motoru

Alan adı uzantısı ve yansıttığı kurum aşağıdakilerinken hangisinde yanlış eşleştirilmiştir?

A) mil.tr -yargı kurumları
B) gov.tr -resmi hükümete bağlı kurumlar
C) edu.tr - organizasyonlar (dernek vb.)
D) org.tr - ticari kuruluşlar
E) com.tr - eğitim kurumları (üniversite vb.)

'www.edusolutions.org' alan adındaki (domain adı) bölümlerin fonksiyonları aşağıdaki şıklardan hangisinde doğru verilmiştir? (örnek: www.edusolutions.org)

A) www. = ana sunucu (sitenin nerde bulunacağı)
edusolutions = kurum ya da şirketin adı
.org = kurum tipi
B) www. = kurum ya da şirketin adı
edusolutions = kurum tipi
.org = ana sunucu (sitenin nerde bulunacağı)
C) www. = kurum ya da şirketin adı
edusolutions = ana sunucu (sitenin nerde bulunacağı)
.org = kurum tipi
D) www. = ana sunucu (sitenin nerde bulunacağı)
edusolutions = kurum tipi
.org = kurum ya da şirketin adı
E) www. = kurum tipi
edusolutions = kurum ya da şirketin adı
.org = ana sunucu (sitenin nerde bulunacağı)

Aşağıda verilmiş olan mantıksal operatörlerden hangisi çevrimiçi arama yaparken 'taramayı daraltmak ve birbirleriyle ilişkili kavramları aramak' için kullanılır?

A) OR B) * C) FileType D) EXCEPT E) AND

Aramayı genişletmek ve girilen anahtar kelimelerden en az birinin yer aldığı kaynakları görüntülemek için kullanılan mantıksal operatör aşağıdakilerden hangisidir?

A) AND B) * C) OR D) EXCEPT E) FileType

'Yaratıcılık' ve 'Eğitim' anahtar kelimelerini içeren, "Drama eğitimi" söz öbeğini içermeyen ve sadece 'edu.tr' uzantılı web sayfalarında yer alan kaynakları görüntülemek için arama motoruna girilen bilgiler aşağıdakilerden hangisinde doğru verilmiştir?

A) yaratıcılık, eğitim, "drama eğitimi", edu.tr
B) "yaratıcılık", "eğitim", "drama eğitimi", "edu.tr"
C) "yaratıcılık" OR "eğitim" NOT "drama eğitimi" site:edu.tr
D) yaratıcılık AND eğitim NOT "drama eğitimi" site:edu.tr
E) yaratıcılık * eğitim "drama eğitimi" filetype:edu.tr

'**NOT**' mantıksal operatörünün çevrimiçi arama yapılırken kullanılması aşağıdakilerden hangisine sebep olabilir?

A) Çevrimiçi araştırma yaparken aramayı genişletmek
B) Taramada kullanılacak anahtar kelimeyi otomatik seçmek
C) Arkasından yazılan anahtar kelimenin filtrelenmesini sağlamak
D) Bir kelime kökünden türetilmiş farklı kelimeleri de aramaya dahil etmek
E) Bulunan sonuçları PDF dosyasına çevirerek otomatik indirmek

Sadece "kullanıma, paylaşıma ve değiştirmeye açık" olan kaynakları görüntülemek için gelişmiş google arama motorundaki hangi filtreyi kullanmamız gerekir?

A) Güvenli arama B) Dosya türü C) Site veya alan adı
D) Kullanım hakları E) Dil

Aşağıdakilerden hangisi çevrimiçi bulduğumuz kaynakları değerlendirirken dikkate almamız gereken kriterlerden değildir?

A)Yazarlık B) Objektiflik C) Güncellik D) Doğruluk E) Mizanpaj

Aşağıdakilerden hangisi taraflı (yanlı) bilgidir?

A) İstiklal marşımızın şairi Mehmet Akif Ersoy'dur
B) Türkiye istatistik kurumu raporuna göre işsizlik azaldı
C) Okul öncesi eğitimde en iyi yöntem dramadır
D) Ay dünyanın uydusudur
E) Güneş sistemindeki en büyük gezegen Jüpiter'dir

Bir bilginin güncelliği hakkında yargıda bulunmak için bakmamız gereken tarihlerin öncelik sırası hangi seçenekte doğru verilmiştir?

A) Bilginin yazıldığı tarih-Dokümanın yayımlandığı tarih-Web sayfasının son güncellendiği tarih
B) Bilginin yazıldığı tarih- Web sayfasının son güncellendiği tarih-Dokümanın yayımlandığı tarih
C) Dokümanın yayımlandığı tarih-Web sayfasının son güncellendiği tarih-Bilginin yazıldığı tarih
D) Web sayfasının son güncellendiği tarih-Bilginin yazıldığı tarih-Dokümanın yayımlandığı tarih
E) Web sayfasının son güncellendiği tarih-Dokümanın yayımlandığı tarih-Bilginin yazıldığı tarih

I. Bilginin bulunması
II. Bilgi ihtiyacının tanımlanması
III. Bilginin iletimi
IV. Bilginin kullanılması
V. Değerlendirme
VI. Bilginin aranması

Yukarıda verilen *'bilgi problemi çözme'* aşamalarının doğru sıralanışı aşağıdakilerden hangisidir?

A) I-II-VI-VI-III-V
B) II-VI-I-IV-III-V
C) II-VI-III-I-IV-V
D) V-II-IV-IV-III-I
E) II-VI-I-III-V-IV

Bilgi problemi çözme aşamalarından olan *'bilginin kullanılması*' sürecinde aşağıdakilerden hangisinin yapılması beklenmez?

A) Bilgi erişim araçlarına başvurmak
B) Bulunan bilgileri değerlendirmek
C) Bulunan bilgileri sahip olunan bilgilerle birleştirmek
D) Sebep-sonuç ilişkisi kurmak
E) Bulunan bilgileri farklı şekilde yeniden ifade etmek

Bir araştırmacı başka bir kaynaktaki bilgiyi kendi ifadeleriyle raporunda APA kurallarına uygun olarak kullanmıştır. Bu araştırmacının yaptığı işlem nasıl tanımlanır?

A) Kaynakça yazmıştır
B) Analiz yapmıştır
C) Dolaylı alıntı yapmıştır
D) Doğrudan alıntı yapmıştır
E) Değerlendirme yapmıştır

Genel olarak bir paragrafta bulunması gereken bölümler hangi seçenekte doğru verilmiştir?

A) Tez cümlesi-Giriş cümlesi-Sonuç cümlesi
B) Giriş cümlesi-Gelişme cümleleri-Sonuç cümlesi
C) Giriş cümlesi-Gelişme cümleleri-Tez cümlesi
D) Giriş cümlesi-Tez cümlesi-Sonuç cümlesi
E)Tez cümlesi-Konu cümlesi-Sonuç cümlesi

Paragraf bölümü ve amacı hangi seçenekte doğru verilmiştir?

A) Gelişme cümlesi -okuyucunun dikkatini çekebilmek
B) Sonuç cümlesi -okuyucuya konu hakkında genel fikir vermek
C) Sonuç cümlesi - paragraftaki uyum ve bütünlüğü sağlamak
D) Gelişme cümlesi -konu hakkında detay, tanım ve örnek vermek
E) Gelişme cümlesi - ana düşünceyi yeniden vurgulamak

Aşağıdakilerden hangisinin akademik bir raporun (metnin) gelişme paragrafında yer alması beklenir?

A) Başlık
B) Kanıt
C) Tez cümlesi
D) Özet
E) Sonuç

Aşağıdakilerden hangisi giriş paragrafının yazılma amaçlarından biridir?

A) Konu hakkında detaylı bilgi vermek
B) Örnek barındırmak
C) Okurun ilgisini çekmek
D) Argümanlara kanıt göstermek
E) Paragraflar arası geçiş sağlamak

Aşağıdaki seçeneklerden hangisini yaparsak intihal yapmış oluruz?

A) Kaynağı kaynakça listesinde belirtip metin içi referans vermek
B) Referans vererek başkalarının fikirlerini kendi cümlelerimizle anlatmak
C) Şekil ve resimleri kopyalayıp kendi ifadelerimizle yorumlamak
D)Dolaylı yerine doğrudan alıntı yapmak
E) Genel geçer bilgileri kendi ifadelerimizle kullanmak

Aşağıdakilerden hangisi APA 6'ya uygun dorudan alıntıya örnektir?

A) "Birleştirilmiş sınıf, bir öğretmenin aynı anda bir derslikte düzeyleri farklı olan sınıfların öğretiminden sorumlu olduğu bir öğretim uygulamasıdır" (Sağ, 2010, s.46).
B) "Birleştirilmiş sınıf, bir öğretmenin aynı anda bir derslikte düzeyleri farklı olan sınıfların öğretiminden sorumlu olduğu bir öğretim uygulamasıdır" (Sağ, 2010).
C) Bir derslik içerisinde farklı sınıf düzeylerinde bulunan öğrencilerle tek bir öğretmenin eş zamanlı olarak yaptığı öğretim uygulaması birleşmiş sınıf olarak tanımlanabilir (R. Sağ, 2010).
D) Bir derslik içerisinde farklı sınıf düzeylerinde bulunan öğrencilerle tek bir öğretmenin eş zamanlı olarak yaptığı öğretim uygulaması birleşmiş sınıf olarak tanımlanabilir (Sağ, 2010).
E) "Bir derslik içerisinde farklı sınıf düzeylerinde bulunan öğrencilerle tek bir öğretmenin eş zamanlı olarak yaptığı öğretim uygulaması birleşmiş sınıf olarak tanımlanabilir" (R. Sağ, 2010, s.46).

Orijinal metin: Birleştirilmiş sınıf, bir öğretmenin aynı anda bir derslikte düzeyleri farklı olan sınıfların öğretiminden sorumlu olduğu bir öğretim uygulamasıdır.

Doğrudan alıntı: "Birleştirilmiş sınıf, bir öğretmenin aynı anda bir derslikte düzeyleri farklı olan sınıfların öğretiminden sorumlu olduğu bir öğretim uygulamasıdır" (R. Sağ, 2010).

Yukarıdaki doğrudan alıntı hatalıdır. Hatanın sebebi aşağıdakilerden hangisidir?

A) Sayfa numarasının verilmemiş olması
B) Tırnak işaretleri içerisine alınmış olması
C) Yazar isminin tamamının verilmemiş olması
D) Yazar isminin baş harfinin verilmiş olması
E) İtalik olarak verilmiş olmaması

Orijinal metin: Birleştirilmiş sınıf, bir öğretmenin aynı anda bir derslikte düzeyleri farklı olan sınıfların öğretiminden sorumlu olduğu bir öğretim uygulamasıdır.

Dolaylı alıntı: Bir derslik içerisinde farklı sınıf düzeylerinde bulunan öğrencilerle tek bir öğretmenin eş zamanlı olarak yaptığı öğretim uygulaması birleşmiş sınıf olarak tanımlanabilir (Sağ, 2010, s.46).

Yukarıdaki dolaylı alıntı hatalıdır. Hatanın sebebi aşağıdakilerden hangisidir?

A) Tırnak içine alınmamış olması
B) Orijinal ifadenin değiştirilmiş olması
C) İsmin baş harfinin verilmemiş olması
D) Sayfa numarası verilmiş olması
E) İtalik yazılmamış olması

APA 6 yazım kılavuzuna göre, yapılan doğrudan alıntılar için aşağıdaki ifadelerden hangisi doğrudur?

A) Tırnak işaretleri ("....") kullanılması gerekmez
B) Yazarın adı ve soyadı parantez içinde verilmelidir
C) Parantez içinde sayfa numarası da verilmelidir
D) Parantez içinde sadece tarihin verilmesi yeterlidir
E) Parantez içinde verilen bilgiler kaynakçada tekrar verilmez

Aşağıdakilerden hangisi APA 6 ya uygun dolaylı alıntıya örnektir?

A) "Birleştirilmiş sınıf, bir öğretmenin aynı anda bir derslikte düzeyleri farklı olan sınıfların öğretiminden sorumlu olduğu bir öğretim uygulamasıdır" (Sağ, 2010, s.46).
B) "Birleştirilmiş sınıf, bir öğretmenin aynı anda bir derslikte düzeyleri farklı olan sınıfların öğretiminden sorumlu olduğu bir öğretim uygulamasıdır" (Sağ, 2010).
C) Bir derslik içerisinde farklı sınıf düzeylerinde bulunan öğrencilerle tek bir öğretmenin eş zamanlı olarak yaptığı öğretim uygulaması birleşmiş sınıf olarak tanımlanabilir (R. Sağ, 2010)
D) Bir derslik içerisinde farklı sınıf düzeylerinde bulunan öğrencilerle tek bir öğretmenin eş zamanlı olarak yaptığı öğretim uygulaması birleşmiş sınıf olarak tanımlanabilir (Sağ, 2010)
E) "Bir derslik içerisinde farklı sınıf düzeylerinde bulunan öğrencilerle tek bir öğretmenin eş zamanlı olarak yaptığı öğretim uygulaması birleşmiş sınıf olarak tanımlanabilir" (R. Sağ, 2010, s.46)

Aşağıdaki ifadelerden hangisi APA 6 yazım kılavuzuna göre yapılan dolaylı alıntılar için söylenebilir?

A) Dolaylı alıntı yapılan ifadeler tırnak işaretleri ("....")arasında verilmelidir
B) Dolaylı alıntı Parantez içinde sadece yazarın soyadı ve yayın yılı yer alabilir
C) Dolaylı alıntı yapılan kaynak, kaynakça listesinde gösterilmesi zorunlu değildir.
D) Kaynağın adı parantez içinde verilmelidir
E) Parantez içinde tarihin yanı sıra sayfa numarası da verilmelidir

Aşağıdakilerden hangisi kaynakçada verilmesi gereken makale bilgilerinden değildir?

A) Yazar(ların) adı ve soyadı
B) Makalenin yayımlandığı tarih
C) Yazarların unvanları
D) Yayımlandığı dergi adı
E) Makalenin yayımlandığı sayı

APA 6 yazım kuralına göre kaynakça yazımı için aşağıda verilen ifadelerden hangisi yanlıştır?

A) Metinde (raporda) yapılan doğrudan ve dolaylı alıntıların hepsi için kullanılan kaynaklar kaynakçada alfabetik sırayla verilmelidir

B) Kaynakçanın ihtiva edeceği bilgiler dokümanın çeşidine göre farklılık gösterir.
C) Kaynakçanın verilme amaçlarından bir tanesi, okurun detaylı bilgiye ihtiyaç duyması halinde kaynağa kolayca ulaşabilmesini sağlamaktır.
D) Web sayfalarını kaynakçada listelerken kaynağın linki verilmelidir.
E) Kaynağın sayfa numarası yoksa (örneğin web sayfası gibi) o kaynağın kaynakçada listelenmesine gerek yoktur.

Editörlü bir kitap bölümünün kaynakça listesinde APA 6 yazım kılavuzuna göre listelenebilmesi için aşağıdaki bilgilerden hangisine ihtiyaç yoktur?

A) Yazar(lar)ın adı ve soyadı
B) Kitabın yayımlandığı yayın evinin adı
C) Kitap bölümünün adı
D) Kitabın editör veya editörlerinin adı ve soyadı
E) Kitabın içindekiler bölümü

SORU NO					
1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
13	A	B	C	D	E
14	A	B	C	D	E
15	A	B	C	D	E
16	A	B	C	D	E
17	A	B	C	D	E
18	A	B	C	D	E
19	A	B	C	D	E
20	A	B	C	D	E
21	A	B	C	D	E
22	A	B	C	D	E
23	A	B	C	D	E
24	A	B	C	D	E
25	A	B	C	D	E
26	A	B	C	D	E
27	A	B	C	D	E
28	A	B	C	D	E

I. PERFORMANCE TASK

PERFORMANS SINAVI YÖNERGESİ

1. Uzamsal Yeteneğin gelişmesinde artırılmış gerçeklik uygulamalarının rolü ile ilgili 2014 tarihinden sonra yayımlanmış üç adet araştırma makalesi bularak sınav klasörünün içinde yer alan ‘Cevap 1’ klasörüne indiriniz.

2. Ekte sunulan dokümanda bilgi okuryazarlığı hakkında bazı bilgiler ve bu bilgilerin yer aldığı kaynakların künyesi yerilmiştir. Aşağıda verilen metni dikkatlice okuyarak metinde boş bırakılan alanlardan her birini ekte sunulan bilgilerden en uygun olanını alıntı yapmak suretiyle doldurunuz. Alıntılardan iki tanesi doğrudan iki tanesi ise dolaylı olarak yapınız. Alıntı yaparken, alıntı yapacağınız bilginin boş bırakılan alana anlamca uygun olduğundan emin olunuz. Ayrıca, bilginin kaynağını yazarlık, güncellik, objektiflik, doğruluk gibi derste gördüğümüz kriterler çerçevesinde değerlendirildiğinizde bilgiyi alıntılarken en güvenilir kaynağı tercih ediniz. Alıntıları için APA 6 yazım kılavuzuna uygun olarak yazmayı unutmayınız.

Bilgi Okuryazarlığı

Bilgi okuryazarı …….. Alanyazına bakıldığında bilgi-okuryazarı olan bireylerden beklenen beceriler ile bilgi problemi çözme aşamaları olarak da tanımlanan temel bilgi becerilerinin oldukça benzerlik gösterdiği görülmektedir. Bilgi problemi çözmenin birinci aşaması bilgi ihtiyacının fark edilerek ihtiyaç duyulan bilginin tanımlanmasıdır. İhtiyaç duyulan bilginin tanımlanmasının ardından, ikinci aşama olan, bilgi arama gelmektedir. Bu aşamada istenilen bilgiye ulaşabilmek için en uygun arama tekniklerini ve bilgi erişim sistemlerini belirlemek durumundadır. Etkili arama stratejileri oluşturur ve uygular.

Bu amaçla öncelikle anahtar kelimeleri ve araştırmanın sınırlarını belirler. Arama kriterlerini işe koşmada mantıksal arama operatörlerinden faydalanır. Örneğin, anahtar kelimeyi başlıkta barındıran kaynaklara ulaşmak için ‘intitle’ operatöründen faydalanır. Çünkü ‘intitle’ operatörü …….

Bir sonraki aşama ise ‘Bilginin Bulunması’ aşamasıdır. Bu aşamada, arama sonucunda bulunan kaynakları ilgililik, yazarlık, güvenirlik, doğruluk, güncellik ve objektiflik gibi kaynak değerlendirme kriterlerine göre değerlendirir. Kaynakta yer alan bilgilerin önyargı veya çelişki içermediğine ve yanlı olmadığına emin olmak ister. Ayrıca bilginin doğruluğunu sorgular. Bu aşamada kaynağın yazarının kim olduğu, kaynağın editörünün olup olmadığı ve kaynakta yer verilen bilgilerin konu alan uzmanı olan hakemler tarafından değerlendirilip değerlendirilmediği önemlidir.

Bilginin kullanımı aşamasında ise, elde edilen bilgilerden çıkarılan temel fikirler özetlenerek not edilir. Elde edilen bilgiler önceden var olan bilgilerle sentezlenerek bilgi problemi çözülür. Eğer çözülmemiş ise, arama kriterleri ve anahtar kelimeler revize edilir veya yeni ihtiyaç duyulan bilgiler belirlenerek süreç tekrarlanır. Çünkü bilgi problemi çözme süreci doğrusal değildir. Bilgi problemi çözmenin son aşaması bilginin iletilmesidir. Bu aşamada, bilgi düzenlenir ve farklı formatlarda başkalarına iletilebilir. Bilgi iletilirken dikkat edilmesi gereken en önemli husus yararlanılan kaynakların gerekli göndermeler yapılır. Bu göndermeler doğrudan veya dolaylı olarak yapılan alıntılarla mümkündür. Dolaylı alıntının doğrudan alıntıdan farkını ……..……..….... olarak özetlemek mümkündür. Bilginin iletiminde kaynaklara göndermeler yapılmaz ise, bu bilgilerin tarafımıza ait olduğu anlamına gelebilir. Bu durumda intihal (aşırma) yapmış oluruz. Çünkü intihal ……..……. Alıntı yapılan kaynaklar kaynakçada belirtilmesi zorunludur.

3. İkinci soruyu cevaplandırırken tercih ettiğiniz eserlerin kaynakçasını aşağıya oluşturunuz.

J. PERFORMANCE EVALUATION RUBRIC

PERFORMANS DEĞERLENDİRME RUBRİĞİ		
	Kriterler	**Puan aralığı**
1. Kısım	Herbir eser için; Eserin türü Makale=2 puan, Diğer=1 puan, Yok=0 puan	0-6
	Herbir eser için; anahtar kelime (herbiri için ayrı ayrı bakılacak) Başlıkta ise=2 puan, Metinin içinde ise=1 puan, Yoksa=0 puan	0-12
2. Kısım	Herbir doğrudan alıntı için; 4 puan eksi yapılan hata sayısı Tırnak? Parantez? Yazar soyadı? Yıl, sayfa no? Ekstra bilgi?	0-8
	Herbir dolaylı alıntı için; 4 puan eksi yapılan hata sayısı Paraphrase? Parantez? Yazar soyadı? Yıl, sayfa no? Ekstra bilgi?	0-8
	Her bir Kaynak için; 2 puan eksi şartları sağlamayan kriter sayısı	0-8
3. Kısım	Herbir kaynak için; 5 puan eksi yapılan hata sayısı Yazar soyadı-ad baş harfi, yıl, eser adı, yayımcı, basım yeri, sayı, basım yeri vb.	0-20
4. Kısım	Giriş paragraf yok=0 Giriş paragrafı iyi yapılandırılamamış ve net bir hipotez cümlesi yok =1 Giriş paragrafı iyi yapılandırılamamış veya net bir hipotez cümlesi yok =2 Giriş paragrafı iyi yapılandırılamış ve net bir hipotez cümlesi var =3	0-3
	Gelişme paragrafı yok=0 Gelişme paragrafi iyi yapılandırılmamış ve tez yeterince desteklenmemiş=1 Gelişme paragrafi iyi yapılandırılmamış veya tez yeterince desteklenmemiş=2 Gelişme paragrafi iyi yapılandırılmış ve tez yeterince desteklenmiştir=3	0-3
	Argumanı desteklemek için kanıt gösterilmemiştir=0 Argumanı desteklemek için kanıt göstermiş lakin alıntı tezini desteklemekten uzak=1 Argumanı desteklemek için tezini destekleyen kanıt göstermiş lakin alıntı hatalı=2 Argumanı desteklemek için tezini destekleyen kanıtı uygun şekilde alıntı yapmış=3	0-3
	Kanıt gösterilen bilginin kaynağı yazarlık, güncellik, objektiflik, doğruluk gibi kriterlerden birçoğunu sağlamıyor=0 Kanıt gösterilen bilginin kaynağı yazarlık, güncellik, objektiflik, doğruluk gibi kriterlerden çoğunu sağlıyor=1 Kanıt gösterilen bilginin kaynağı yazarlık, güncellik, objektiflik, doğruluk gibi kriterlerin tamamını sağlıyor=2	0-2
	Metin APA kuralları ve Metin Yapısı bakımından zayıf organize edilmiş ve içerik zayıf=1 Metin APA kuralları ve Metin Yapısı bakımından zayıf organize edilmiş fakat içerik kısmen iyi=2 Metin APA kuralları ve Metin Yapısı bakımından kısmen iyi organize edilmiş fakat içerik limitli=3 Metin APA kuralları ve Metin Yapısı bakımından kısmen iyi organize edilmiş ve içerik bilgilendirirci=4 Metin APA kuralları ve Metin Yapısı bakımından iyi organize edilmiş ve içerik bilgilendirici=5	0-5

CURRICULUM VITAE

PERSONAL INFORMATION

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EDUCATION

Degree	Institution	Year of Graduation
MS	UNIVERSITY OF CINCINNATI	2012
BS	SELCUK UNIV. Faculty of Education	2007
High School	FKM Anadolu High School, Ankara	2002

WORK EXPERIENCE

Year	Place	Enrollment
2013-Present	MAKU Faculty of Education	Research Assistant
2007-2008	Yazihuyuk Gazi Primary School	Teacher

FOREIGN LANGUAGES

English - Advanced

PUBLICATIONS

1. Baser Gulsoy, V. G., Erol, O. & Akbay, T. (2016). Ortaokul öğrencilerinin bilimsel epistemolojik inançlarının farklı değişkenlere göre incelenmesi. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*, *35*, 1-28.

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4. Baser Gülsoy, V. G., Sezgin, S., & Akbay, T. (2014). BÖTE Bölümü Öğretmen Adaylarının Üst Bilişsel Farkındalık Düzeylerinin Çeşitli Değişkenler Açısından İncelenmesi. 8. Uluslararası Bilgisayar ve Öğretim Teknolojileri Sempozyumu. 18-20 Eylül 2014. Edirne: Trakya Üniversitesi

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6. Baser Gülsoy, V. G., Akbay, T., & Sezgin, S. (2014). BÖTE Öğrencilerinin 21 YY Becerileri Algılarının Kelime ilişkilendirme Testi Yoluyla Saptanması. 8. Uluslararası Bilgisayar ve Öğretim Teknolojileri Sempozyumu. 18-20 Eylül 2014. Edirne: Trakya Üniversitesi

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