

MINDFULNESS AND SELF REGULATED LEARNING

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PREFACE

This thesis is called mindfulness and self-regulated learning and is about how mindfulness impacts engagement with learning, here tested as test anxiety, goal accomplishments and learning strategies. It is argued that part of the reason that mindfulness impacts self-regulated learning has to do with how mindfulness regulates attention, affect and behavior. The thesis consists of two papers that can be read independently or together. The first paper considers the psychometric qualities of the scales used and correlation between mindfulness dimensions and self-regulated learning scales. The second paper investigates students' mindfulness tendencies and how they impact self-regulated learning.

A long time interest of mine has been and still is how some students develop good study habits and persevere in the face of obstacles while others withdraw or continuously struggle to keep up. Part of my inspiration has come when I was introduced to the concept of flow and mindfulness, flow as a state characterized as a form of optimal engagement and mindfulness as a present focused attention. After a time, my interest in flow was substituted with an interest in self-regulation which also can be considered as a form of engagement with task, but perhaps focuses more on the processes. Mindfulness was introduced to me by a close friend, Torkel Djupmyr, who have been a continued source of creative input. Thus, the theme for my thesis was set.

I want to thank my study colleges for the interesting discussions over lunch, dinner and coffee that have given me new energy to continue working in dark times. I want to thank my advisors Torbjørn Rundmo for his invaluable help and methodological insight, and continued help till the end. Many thanks also to Øyvind Eikrem for his support and creative feedback in the beginning of this project. I also want to thank Kyrre Svarva for helping me with my questionnaire and for methodological input. The making of the questionnaire was a challenge and if ever I am to repeat this procedure, I will do it online ☺. Thus, I want to thank the students that have responded and taken their time to fill in the questionnaire.

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ABSTRACT

The main purpose of this thesis was to investigate the association between mindfulness and self-regulated learning. Mindfulness is used in the treatment of stress and anxiety, and has been associated with attention regulation and affect-regulation. Mindful individuals have been found to use more strategies to keep attention on task to enhance their performance. It was therefore predicted that mindfulness would be positively associated with self-regulated learning. The data was collected using self-report questionnaires and consisted of three different measurements; the Five Facet Mindfulness Questionnaire (FFMQ) [(Baer, R. A., Smith, G. G., Hopkins, J., Krietemeyer, J. & Toney, L. (2006). Using Self-Report Assessment Methods to Explore Facets of Mindfulness. *Assessment*, 13(1), 27 – 45.)], test anxiety and the strategy section of the “Motivational Strategic Learning Questionnaire” (MSLQ) [(Pintrich, P. R., Smith, D. A. F., Garcia, T., & Mckeachie, W. J. (1991). A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ). Non-Journal item.)], and a sample from Locke and Latham goal – setting questionnaire. The respondents were 346 students from the “Norwegian University of Science and Technology” (NTNU), with a response rate of 41%. A theoretical link between mindfulness and self-regulated learning is initially introduced, before the empirical investigation. The reliability of the instruments used and dimensional structure was checked to investigate the measurements reliability and consistencies with previous finding. The main aim was then tested, which consisted of testing association between mindfulness and self-regulative learning components, measured as students use of learning strategies, meta-cognitive self-regulation strategies, test anxiety and as goal-setting. Inter-correlations between the indices were performed. Cluster analysis was used to determine response tendencies within the mindfulness dimensions and MANOVA was applied to test differences between the clusters in self-regulated learning. The results indicated that the dimensional structure of the FFMQ was replicated with satisfactory Chronback alpha. Reliability of the learning strategy indices was consistent with previous results. The correlations between the different measurements revealed the facets of mindfulness to be positively correlated with learning strategies, and negatively correlated with test anxiety. Mindfulness was furthermore, across all facets, consistently and significantly positively correlated with goal accomplishment and negatively with goal dissatisfaction. Cluster analysis revealed that the cluster with a combination of high scores on mindfulness facets scored consistently better on the self-regulated learning facets. These results stayed significant even when gender, age and education were controlled for.

1. INTRODUCTION

1.1 Mindfulness

Mindfulness originates from eastern spiritual practice and is frequently associated with meditation, specifically mindfulness meditation or Vipassana meditation; a method used to facilitate closer contact with ongoing experiences, or insight into one's own mind. Increasingly, mindfulness is being implemented as part of different therapeutic treatments. The most known may be "Mindfulness-Based Stress Reduction" (MBSR) and "Mindfulness-Based Cognitive Therapy" (MBCT). The MBSR consist of an eight week guided mindfulness mediation course, aimed at reducing stress and chronic pain. It started up in the medical clinic in Massachusetts in 1979, spear headed by Kabat-Zinn. The MBCT were inspired by MBSR and developed by Segal, Williams and Teasdale, and aims at treating depression and preventing depression relapse (Segal et al., 2002).

Mindfulness meditation is a receptive state, where attention is directed towards the present moment and sustained on immediately experience (Brown et al., 2007). In the MBSR program the practitioners are encouraged to notice thoughts that enter awareness, to acknowledge them, and to bring attention back to the present moment. The breath is often used as a point of focus. Thoughts and feelings are observed as they occur without evaluation their "goodness" or "badness" (Kabat-Zinn, 1990). The typical posture in mindfulness meditation is an upright cross-legged posture, where one attempts to keep attention on whatever external or internal somatic sensation of one's choice, typically the breath (Kabat-Zinn, 1990; Bishop et al., 2004). Whenever thoughts start to wander or thoughts arise, the client takes notice of them, lets them go, and returns attention to the breath. Intrusive thoughts' that enters awareness are registered, but not engaged or elaborated on (e.g., Bishop et al., 2004; Brown et al., 2007).

There exist many different understandings and definitions of mindfulness, but maybe the most well-known are the one articulated by Kabat-Zinn. Kabat-Zinn (2006) defined mindfulness as "*the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment*" Other cognitive-affective qualities with mindfulness include non-striving, acceptance, patience, trust, openness, and letting go (Kabat-Zinn, 1990). Bishop et al. (2004) identified two key

components of mindfulness or mechanisms of mindfulness. *“The firstly component involves the self-regulation of attention so that it is maintained on immediate experience, thereby allowing for increased recognition of mental events in the present moment. The second component involves adopting a particular orientation towards one’s experiences in the present moment, an orientation that is characterized by curiosity, openness, and acceptance”* (Bishop et al., 2004). Two characteristics are emphasized in both of these definitions, a present moment focus paired with certain affective-cognitive qualities of attention. An interaction between these two components is suggested, such that attitudes or the affective-cognitive qualities associated with mindfulness increases access to present moment experiences (Kabat-Zinn, 1990; Bishop et al., 2004).

Conceptualizations of mindfulness, differs by whether it is considered as a one-dimensional or as a multi-dimensional construct. Bear et al. (2004) identified four mindfulness skills that are facilitated in mindfulness meditation, observing, describing, acting with awareness and accepting. “Observing” involves attention towards a variety of stimuli, such as cognition, emotion, sounds and smell, texture, touch, the location, intensity and pitch of sound. “Describing” involves labeling, describing and covertly applying words to observed phenomenon, but encouraged to use non-judgment, not judgmental labels (e.g., It is stupid to feel this way). “Acting with awareness” involves doing something with undivided attention. Such mindfulness exercises can for example be to do a mundane task without thinking about other things, and without letting the mind wander off into plans for the future or thoughts about the past. “Acting with awareness” is often contrasted with acting on “automatic pilot”. In FFMQ this skill is measured negatively (e.g., I am easily distracted) (Bear et al., 2004; 2006). A forth skill involves “accepting (or allowing) without judgment”. This skill involves refraining from applying evaluative labels like good or bad, right or wrong, worthless or worthwhile. It is meant to discourage automatic, impulse behaviors, by allowing the present to be as it is, and is often combined with observing and describing (Bear et al., 2004).

Langer & Moldoveanu (2000) defined mindfulness as actively drawing novel distinctions. A well-known example used by Kabat-zinn in MBSR course to facilitate the mindfulness state, is the exercise of describing a resin. In this exercise the participants are guided to pay attention to different aspect of the resin, such as touch, smell, taste, texture and so on. These two understandings of mindfulness may therefore be partly overlapping. However, mindfulness involves inhibition of elaborative processed and concerns primarily internal

stimuli (Bishop et al., 2004). Langer focuses on actively making new categories and meanings and focuses primarily on external the context.

1.2 Self-regulated learning

Shapiro and Schwartz (2000) defined self-regulation as the process by which a system regulates itself to achieve specific goals. Shapiro and Schwartz, (2000) integrated intention into self-regulation theory. Pointing out that attention is not enough, for example may grooming not be health promoting if done with attitudes of self-criticism, need for perfection, and frustration (Shapiro & Schwartz, 2000). They further argued that a system must be regarded as whole, rather than the sum of local relationships. In his view interaction between parts gives rise to new properties within the system, in much the same way as water qualitatively differs from its' interacting components, hydrogen and oxygen (Shapiro & Schwartz, 2000). Keeping with this analogy water regulate its' components, hydrogen and oxygen, while the components are regulated by each other and the whole (e.g., water). In this context, mindfulness, which involves moment to moment inward attention infused with mindfulness qualities, such as, non-judgment, acceptance, curiosity and openness may bring certain qualities to attention which in turn alters how attention regulates behavior.

“Self-regulation refers to self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals” (Zimmerman, 2000). Roughly, this definition can be divided into two parts, one that entail self-generated thoughts, feelings and actions and another which entail cyclically adaptive to attainment of goal. In relation to the former, this will be discussed in subsequent sections in relation to mindfulness and self-regulated learning.

Several researchers seem to converge of the idea that goals and feedback are integrative parts of self-regulation (e.g., Butler & Winne, 1995; Zimmerman, 2000; Carver & Scheier, 2000; Shapiro & Schwartz). According to Carver and Scheier (2000) self-regulation is goal directed and feedback controlled. Goals are the way people give meaning to their lives and are integrated in who we are. Different concepts are used to describe this, such as, possible self, ideal self, ought self and self-guides (Carver & Scheier, 2000). In this way feedback mechanisms are influenced by our perception of who we are. A difference implies a discrepancy and energizes us to changes behavior to reduce this difference. Carver and

Scheier (2000) identified two kinds of feedback loops, discrepancy reducing loops; aiming at reducing the discrepancy between the perception or current states and the goal state, and discrepancy enlarging loops; aiming at creating distance between anti-goal (i.e., unwanted outcomes) and goal. Feedback and goals are in this way part of the same underlying mechanism. Goals can be defined very concretely, as a plan for the day or chores to do, but it can also be defined as part of our ideal and ought selves. Ideal self are for example best wishes to the self, or plans for the future, or responsibilities and obligations. Carver and Scheier (2000) suggested that goals were hierarchically organized, such as (e.g., holding ones breath for 3 minutes, working more to make more money) or abstractly (e.g., I am diver, happiness), where higher level goals to a greater extent reflect identity.

Affect is created by the speed of progress over time. Positive affect (e.g., confidence) is created when expected progress is faster than expected. Negative affect (e.g., doubt) is created when expected progress is slower than expected. Carver and Scheier (2000) suggested that the comparison process is experienced phenomenologically as affect, positively or negatively. However, positive and negative affect does not necessarily produce engagement with task and disengagement with tasks, respectively. Carver and Scheier (2000) suggest that self-regulation functions in much the same way as would cruise control, where slower progress befalls (e.g., driving up hill), more effort is expended (e.g., more power is used) to keep up with the standard (i.e., the expected speed of progress), faster progress on the other hand (e.g., driving downhill) leads to easing off on the pedal or expending less effort (Carver & Scheier, 2000). In this system both negative and positive affect indicate discrepancy with standard and sets in motion behavior to reduce discrepancy. Therefore, resistance or obstacles may lead to continued effort expenditure and no resistance may lead to casting (e.g., relaxing, i.e., not using all one's resources). However, studies have also found a found a positive association between self-doubt and a tendency to give up on task, indicating that resistance can also lead to giving up on task. If doubt becomes strong enough it may result in a tendency to disengage effort (Carver & Scheier, 2000). In line with these patterns, Locke and Latham (2002) found that effort was associated with task difficulty in a curvilinear pattern. The highest level of effort was expended when task was moderately difficult. Lowest level of effort was expended when task were either too easy or too difficult.

From the above definitions of self-regulation and of mindfulness it is clear that there are certain mechanisms in common which impact students self-regulation. Mindfulness involves

an ongoing present moment attention combined with non-judgment qualities and may therefore allow for a closer monitoring of mental states. This may allow for a closer observation of mental states. The ability to self-observe is also important for the ability to self-regulate (Zimmerman, 2000).

1.3 Main Hypothesis

Studies into mindfulness have accumulated an increasingly mass of support for the connection between mindfulness and psychological well-being (Brown & Ryan, 2003) as well as a negative correlation between mindfulness and various measurements of psychopathologies (Bear et al., 2006). Research into the relationship between mindfulness and self-regulated learning has on the other hand been less frequently carried out. Some studies support the benefit of being mindful in the context of physical activities (Kwa Kee & Wang, 2008; Gardner & Moore, 2004). Kwa Kee and Wang (2008) found that more mindful individuals used more strategies to keep their attention on task. Kwa Kee and Wang (2008) suggested that this could be because of improvement in self-observation in more mindful individual and that this may make them better at detecting threats and emotional events, and therefore more likely to apply learned coping strategies. The main purpose of this thesis was to investigate the association between mindfulness and self-regulative learning. It was hypothesized that mindfulness would be associated with greater or better self-regulated learning.

The investigation into the association between mindfulness and self-regulated learning was here measured with self-report questionnaire using Five Facet Mindfulness Questionnaire (FFMQ), Motivated Strategies for Learning Questionnaire (MSLQ) and a sample of Locke and Latham goal – setting questionnaire. The MSLQ tested students' cognitive strategies, meta-cognitive strategies, and resource management strategies. The goal setting questionnaire taps into students' ability to be self-directive and their experiences of goal accomplishments. The FFMQ tests students' mindfulness tendencies. A theoretical link between mindfulness and learning was initially established, before the empirical investigations. The theoretical text firstly considered how the mindfulness state relates to consciousness. Next, mindfulness and its' regulating effects on cognitive, affective and behavior was considered. Finally, mindfulness and self-regulated learning were considered. The empirical investigation tested the reliability and dimensional structure of the instruments. Consistencies with earlier research were ascertained. Correlation study using a self-report questionnaire was used to test

the association between mindfulness and self-regulated learning. Cluster analysis was used to find groups within the sample and MANOVA was used to test the group differences on self-regulated learning.

2. MINDFULNESS AND SELF-REGULATED LEARNING

2.1 Mindfulness and consciousness studies

Mindfulness is frequently compared with a non-directive state of mind or mode, where present moment experiences, including thoughts and feelings are accompanied by attitudes of non-judgment and acceptance, thus allowing a greater range of experiences into awareness (Bishop et al., 2004). This mode or state is often contrasted with a goal oriented mode of processing, where mental processes are actively engaged in problem solving (Brown et al., 2007). These two modes are by different researchers referred to as “Being” mode and “Doing” mode (Segal et al., 2002; Williams et al., 2007). “Doing” mode is about setting goals, planning ahead, labeling, analyzing, comparing and judging, remembering and self-reflection. Processing power is used to monitor discrepancies between the actual states and desired states, and to set in motion behavior and strategies to reduce this discrepancy (Segal et al., 2002; Williams, 2010). “Being” mode is about seeing, testing, touching, hearing, smelling and generally taking in information from the senses. Processing power is used to take in or notice what already there (Williams, 2010).

Mindfulness can be viewed as a form of self-focused attention, but differs from public and private self-focused attention by the affective qualities that are brought to inner experiences. Public self-consciousness is described as awareness of oneself as a social object and a preoccupation with how one is viewed by others. Private self-consciousness consists of awareness of ones thoughts, feelings, and private motivations, but does not differentiate between the awareness of these and the judgment or immersion in these (Evans et al., 2009). Private and public consciousness are therefore often associated with over-involvement in internal states (Brown and Ryan, 2003; Evans et al., 2009). Brown et al. (2007) claims that mindfulness and private self-awareness is similar in a heightened attention towards subjective experiences, but differs in the role cognition plays in conscious awareness. Thoughts in cognition, informs thought about the self, but the role of cognition in mindfulness is that of a

passive observer or as a witness to one's thoughts (Brown et al., 2007). Mindfulness is then not only about the senses, but also thoughts and feelings. However, thoughts and feelings may be processed in the same way as one would sense stimuli, such as smelling, hearing, or touching.

These two ways of processing may have served an adaptive function in our evolution. By being able to think about the future, one can move with new mental tools into the future (Williams, 2010). It is suggested these two ways of processing corresponds to two different self-systems, specifically, one linking experiences across time and one centered in the present moment (Farb et al., 2007). Farb et al. (2007) argues that these self-systems may be habitually integrated in awareness, but can be differentiated through mindfulness attention training. Emotions may be particularly important for self-regulation and for integration of different mental faculties. Williams et al. (2010) assumes that emotion evolved as a signaling system that had to be sensitive to environmental contingencies. In the face of danger, emotions allowed for quick evaluation of the situation and the activation of necessary responses, for fight or a flight response in response to an external danger. According to Williams (2010) it is our evolved capacity for symbolic representation that makes it possible for emotions, like anxiety and fear to be "online" even when external contingencies are absent. For example mentions Williams (2010) that low mood can reactivate recollections of past loss and humiliation, and anxiety a feeling of past terrors. These responses that once served us well in the past like the fight and flight responses, may not always be purposeful. It is our ability to bring the experience of panic, fear and stress in to the present by thinking about the past and the future that turns the switch "on" when there in reality is nothing in the present moment that warrants those emotions. Mindfulness is not about getting rid of one way of processing, but about teasing those two ways of processing apart, and through this develop an ability to see where natural automatic reactions stop and the further elaboration and avoidance begin (Williams, 2008; 2010).

It may here be prudent to differentiate between adaptive and maladaptive blending of the experiences. Mindfulness is primarily utilized in therapy and treatments of stress and anxiety where quick evaluation or feedback created by narrative selves is what sustains the problem. For example Willams (2010) writes that low mood can reactivate recollection of past loss and humiliation, and anxiety a feeling of past terrors. This may result in a state where narrative selves infringes upon presents states to such a degree that present moment contextual cues

does not reach awareness (Bishop et al., 2007). In such cases a differentiation of narrative self and present moment self may be helpful in allowing these negative emotional states to be more fully engaged.

The idea of two self-systems is not new. One of the earlier articulated ideas on this topic came from William James and differentiated between the self as a knower and the self as known. This distinction can also be conceptualized as the difference between “I” and “Me”, respectively. According to Roeser and Peck (2009) the Me-selves consists of enduring beliefs and values that filters information by quick evaluation of information pertaining to its self-relevance. This can be compared with Farb et al. (2007) differentiation of narrative self and present moment self. The narrative self consists of accumulated and integrated experiences across time and reflects our values and goals. Similarly, Roeser and Peck (2009) writes that the “Me”-self energizes behavior and directs behavior in ways that protects and enhances the “Me”-self, and are therefore responsible for goal behavior and motivation. The “I”-self on the other hand, is considered the willful, the conscious or the volitional experience of the self-system (Roeser & Peck, 2009). Roeser and Peck (2009) define willful as the capacity for conscious activation of particular plans and goals and for the conscious focus and sustaining awareness on a particular object within consciousness. It was suggested that contemplative education like yoga or meditation were means of strengthening executive control processes, such as shifting and sustaining the focus of awareness (Roeser & Peck, 2009). Mindfulness may therefore also improve aspects of future oriented behavior such as goals.

2.2 Mindfulness and regulation of attention

Jah et al. (2007) conducted a study testing the difference on three aspects of attention, alerting (i.e., achieving and maintaining a vigilant or alert state of preparedness), orienting (i.e., directs and limits attention to a subset of possible inputs) and conflict monitoring (i.e., prioritizing among competing tasks and responses) on three groups. The groups were a control group, a group without meditation experience and a group with mindfulness meditation experience. These three groups were tested before and after treatment. The group with meditation experience was participating in a one month mindfulness meditation retreat program, one group that was going to participate in a MBSR course and a control group. Before manipulation the group with meditation experience was better at conflict monitoring, had a faster reaction time and more accurate performance, than the individuals without

mindfulness meditation. The second time the MBSR group was better at orientating attention than the control group. Both orienting and conflict monitoring corresponds to input level selection and response level selection, respectively. These results indicated that mindfulness meditation may influence the ability to narrow attention from the broad band of incoming stimuli, responding selectively to incoming information (Jah et al., 2007).

Shapiro and Schwartz (2000) claims that when we focus attention on our hearts with no intention to alter the rhythm, heart rhythm becomes more regular. Attention in mindfulness is used take in information from the senses with acceptance and openness. It was expected that the way the participants paid attention (e.g., either to the stability or to the change) to their heart rate (HR), influences their control. In this study participants should either try to increase or to decrease their HR. The group that monitored their stability of their heart rate performed worse than the group that monitored their heart rates fluctuations. Delizonna et al. (2009) suggested that viewing bodily processes as stable entities may inhibit its regulation. Delizonna et al. (2009) suggested that attention to the systems stability may blind one to its fluctuations, and therefore open for manipulation. These studies suggested that seeing bodily processes as stable leads to mal-adaptive regulation. It may be that seeing the heart rate as stable makes feedback more general and therefore less rooted in the present moments.

One common denominator for patients that are suffering from depression and post-traumatic stress disorder is their tendency for over-general memory retrieval (i.e., summary of events) (Williams et al., 2000). Williams et al. (2000) found that MBCT reduced the tendency for over-general autobiographical memories. The describing and actively labeling mental events combined with non-judgment are important parts of MBCT. Studies conducted with control group have found improvement in cognitive flexibility, reduction in over-general autobiographical memories, increased autobiographical memory specificity and inhibition of pre-potent responses following MBCT (Heeren et al., 2009). Heeren et al. (2009) found that the reduction in over-general autobiographical memories is partly mediated by increased cognitive flexibility produced by mindfulness based cognitive therapy. These studies support the notion describing and non-judgment may improve self-regulation ability.

2.3 Mindfulness and affect regulation

Being self-critical and judgmental are usually maladaptive self-regulatory strategies (Low et al., 2008; Watkins & Teasdale, 2004). Garden & Moore (2004) outlines several case studies that points to the effectiveness of a Mindfulness Acceptance Commitment (MAC) based approach to athletic performance. Iskender (2009) found a significant positive correlation between mindfulness, control belief for learning and self-efficacy as well as a strong association between self-kindness and mindfulness. Iskender (2009) suggested that individuals that are self-compassionate tend not to judge themselves too harshly when they notice something about themselves they do not like, and that may cause them to persist in spite of setbacks or negative feedback. Studies examining the effects of emotional responses in the treatment of anxiety or in stress eliciting contexts have shown that discrepancy-based processing are maladaptive strategies for handling emotions (Watkins & Teasdale 2004; Ortner et al., 2007). Acceptance based emotional processing lead to more efficient heart rate habituation and recovery (Low et al., 2008).

Ortner et al. (2007) tested how quickly subjects normalized their emotional reaction after being shown affective pictures. 28 mindfulness meditation practitioners categorized tones presented 1 to 4 seconds after a presentation of affective pictures, as neutral, positive or negative. Reaction time was measured against reaction time for the neutral pictures, so that affective minus neutral pictures provided an index for emotional interference. Participants with more MM experience showed less interference from affective pictures and reported higher mindfulness and psychological well-being. This study indicated that mindfulness facilitates greater emotional recovery after stress experiences (Ortner, et al., 2007). Comparisons between Relaxation Meditation (RM) training and Mindfulness Meditation (MM) training showed that the emotional interference effects was specific to the MM group. Ortner et al. (2007) argued that mindfulness practitioners were able to disengage attention more rapidly from emotional provocative stimuli and thus free up attention resources to respond to the tones quicker. One of the mechanisms that facilitated the quicker normalization of affect reaction may be the way attention is used in mindfulness. Arch & Griske (2006) investigated affect regulation with three groups, a focused breathing group, an unfocused breathing group and a worry group. The focused breathing group reported lower negative affect and less emotional reactivity in response to the affective pictures and greater willingness to also observe negative slides. These studies support the association between mindfulness and affect regulation. Carver and Scheier (2000) compared self-regulation to a

cruise control, aiming at holding the object of regulation at a specific level. Quicker return after exposure to upsetting emotional pictures indicated in this context that mindfulness may increase affect regulation.

Negative emotional reactions towards thoughts and emotions may cause distress and lead to avoidance behavior, but it can also impact ability to access specific autobiographical memories. Depressive individuals have a tendency to report over-general autobiographical memories, and are often unable to recall specific events (Watkins & Teasdale, 2004; Williams et al., 2000). Several studies point to reduction in over-general memories following mindfulness training (Williams et al., 2000; Heeren et al., 2009). For example, the induction of an experimental self-focus with depressive patients showed marked improvements in autobiographical memory specificity (Watkins & Teasdale, 2004). The patients were supposed to read from a list, containing items tapping into measure of depression. The experimental focus group got the instructions to focus on their experiences as they read the sentences and to describe the quality of what they saw. The evaluative group were supposed to focus on the cause, consequences, meaning and to understand the issues raised (Watkins & Teasdale, 2004). These studies showed that present moment focus lead to greater access to specific autobiographical memories. Williams et al. (2000) suggested that depressive individuals may have difficulty moving fluently through the memory hierarchy, that is, when attempting to access events from the past, higher level general descriptions are initially accessed and used to gain access to lower level specific representations (Williams et al., 2000). One of the characteristics of mindfulness, as it is measured with FFMQ is describing. These studies support the notion mindfulness is associated with increased observation of present moment experiences.

The ability to closely monitor one's experiences or self-observation is important to self-regulated learning (e.g., Zimmerman, 2000; Zimmerman & Kitsantas, 1997). Low moods like depression may cause memories to be accessed at a general level and therefore fail to generate specific feedback that facilitates performance. This is consistent with this Pintrich and Groot (1990) found a negative relationship between test anxiety and cognitive strategy usage supported by and Locke and Latham (2002) who found that goal specificity were positively associated with goal success.

Evans et al. (2009) investigated the effects mindfulness has on persistence, measured as behavioral self-regulation. This study investigated whether mindfulness would predict persistence on a difficult lab task. The participants were supposed to solve 10 anagrams of various difficulties, with a total time limit of 90 second per anagram. The first anagram had no solution and the participants were asked to move on if they had not done so within 5 min. Mindfulness was measured using FFMQ, a 39-item questionnaire. Non-reaction and non-judgment were significantly related to persistence on this anagram tasks (Evans et al., 2009). It may be that the affective qualities of non-judgment and non-reaction functions as a moderator protecting against negative self-evaluations when encountering obstacles, consequently producing persistence. The ability to closely monitor one's experiences may not be conducive when done in an over-general manner.

2.4 Mindfulness and behavioral regulation

Chatzisarantis and Hagger (2007) examined the moderating effects of mindfulness on the intention-behavior relationship. Chatzisarantis and Hagger (2007) found that mindfulness predicted physical activity only among mindful individuals. A second study was conducted investigating the utility of mindfulness as a protective function from counter intentional habits, such as binge drinking. Counter intentional is here understood as habits that are contrary to one's intentions. This study showed that individuals that were more mindful were more likely to carry out their intention (Chatzisarantis & Hagger 2007). It was argued that a heightened awareness of environmental cues, as well as increased awareness of present moment thoughts and feelings, helps individuals to follow through with their intention. A similar line of research is conducted by Radel et al. (2009).

Radel et al. (2009) performed a slideshow experiment and incorporated words that primed students towards either controlled or autonomic motivation. Controlled motivation was primed by words like "obligation", "constraint" and "ought", autonomic motivation was primed with words like "interested", "willing" and "free". Controlled motivation is behaviour engaged in for external or internal pressure, while autonomous motivated behaviour is about experiences that are freely chosen, a reflection of personal agency (Radel et al., 2009). Radel et al. (2009) found that the less mindful individuals were more strongly primed, or were more vulnerable to the priming conditions. This held true regardless of whether primed condition was controlled or autonomous, indicating that the more mindful individuals may also not

benefit from the positive primes. These results indicated that individuals that are more mindful were more immune to the manipulation. It was suggested that mindful individuals were processing more meta-cognitively, but were unable to change mode of processing when appropriate (Radel et al., 2009). This was consistent with their hypothesis that less mindful individuals would react more automatically. These studies support the notion that the persistence effect associated with mindfulness are associated with taking in information in a more informative way, or more meta-cognitively, rather than positive emotions like self-compassion working as a buffering effect against negative feedback.

Levesque & Brown (2007) tested whether day-to-day motivation would hinge on low or high mindfulness disposition. It was predicted that implicit autonomy orientation would be more predictive of those lower in dispositional mindfulness, while those higher in mindfulness would be motivated autonomously. Levesque and Brown (2007) found that for those low in dispositional mindfulness, implicit autonomy orientation tended to manifest day to day level of autonomy. That is, individual high in implicit autonomy were high in daily autonomy, while those low in implicit motivation orientation showed low levels of daily autonomy. For those higher in mindfulness, degree of day to day autonomy was comparatively high, regardless of implicit autonomy level. Mindfulness may be helpful when implicit motivational orientation is low. Consequently, students that are mindful may be able to keep up motivation despite boring tasks or unmotivated tasks.

Bishop et al. (2004) argued that the ability to discriminate between thoughts and elements of experiences, and to observe how one experience gives rise to another, may lead to the generation of differentiated and integrated representations of cognitive and affective experience. These studies (Brown & Ryan, 2003; Chatzisarantis & Hagger, 2007; Radel et al., 2009; Levesque & Brown, 2007) support the notion that mindfulness may help with acting more in congruence with one's desires and self-endorsed beliefs. Consequently, mindful individuals may develop habits that are more in tune with their endorsed sense of self. Brown and Ryan (2003) suggested that mindfulness functions as an integrative agent by enhancing capacities to act congruently with one's intentions, values and goals. Mindful awareness increases the awareness of thoughts that one wants to engage or to disengage. Becoming aware of thoughts and impulses as they happen and approaching these with non-judgment and non-reaction may create room to let go of ingrained patterns of behavior (Kabat-zinn, 1990). Mindfulness is a way of disconnecting from top-down processes, thus creating opportunities

for tuning and modifying behavior. Presumably, students that are more mindful may in the long run create better study habits than less mindfulness individuals.

Brown et al. (2007) separated between to selves, the self as an object “Me”-self and the self as a subject “I”-self. The “I”-self represents the integrative core of the person, and entails ongoing activities of openly assimilating and bringing coherence to life experiences. In contrast, the “Me”-self concerns the creation of personal identity. This “Me”-self can be thought of as our narrative self, it is integrative to particular roles, belief systems, and goals (Brown et al., 2007). Earlier correlations studies with FFMQ have found a negative association between the observant facet and non-judgment in sample naive to mindfulness meditation, but positively associated in samples with meditation experience (Bear et al., 2006). One of the reasons for this may be that these two types of self-reference systems are un-differentiated (Farb et al., 2007). The act of paying attention to ongoing experiences may therefore be qualitatively different depending upon what attitudes, or cognitive-affective qualities that are brought to the experience. Basically, what is implied is that individuals that have undergone mindfulness meditation training or individuals that are more mindful process information in a less ego involved way and that they may therefore on information less defensively.

2.5 Mindfulness and learning

Mindfulness is used in the context of different therapies, such as in the treatment of stress or depression and chronic pain. In mindfulness the client is taught to relate to thoughts and feelings in a wider, decentered perspective (Bishop et al., 2004). As argued above, this may improve ability to observe present moment experiences. Being able to self-observe are also important when monitoring progress, to keep attention on track and to discover whether the strategies used are effective or not.

Zimmerman and Kitsantas (1997) tested performance in a dart throwing exercise under 8 different experimental conditions with control group and measured self-efficacy, and self-reaction belief and dart throwing results. Participations were given instructions corresponding to 4 different goals, outcome goal, process goal, transformed goal, and shifting goals. Each of these goals had 2 conditions, with self-recording and without self-recording the steps taken. In the self-recording conditions the members of the groups were told to write down the steps

successfully performed. Comparisons between the goal conditions revealed that self-recording conditions did better than the no-recording conditions. Comparisons showed that the shifting goal, transformed goal and the process goal conditions had the best performance among the goal conditions. Members of the outcome and control group explained their results by ability, while the shifting goal, process goal and the transformed goal groups explained their results by choice of strategy or execution.

The process goal conditions paid attention to their body, such as grip, stance, sighting, throw and follow through (Zimmerman & Kitsantas, 1997). These conditions were characterized by having intermediary goals. These studies are consistent with research done by Locke and Latham (2002) who claimed that specific goals improved performance. The self-recording groups performed better than the groups that did not self-record. The act of self-recording requires self-observation and the participants had to judge whether they performed the steps correctly. Closer mindful observation of present moment experiences may enhance feedback mechanisms and through this improve performance.

How we approach challenge influences how we tackle opposition (Dweck, 1986). Dweck (1986) outlined two motivational patterns which determine whether the individual will persist or not in the face of obstacles. Firstly, one characterized by the motivation to increase competence, to master and to understand something new, this she called learning goals. The second aimed at gaining favorable judgment and avoid unfavorable judgment, this motivational pattern she called ability goals. Whereas learning goals predicted active coping, ability goals predicted self-denigration (i.e., speaking ill of themselves or self-criticizing themselves) (Grant & Dweck, 2003). One of the characteristics of individuals that are motivated by the approval of others is their tendency to escape negative affect, such as anxiety (Carver et al., 1983).

Because feedback is interpreted differently by holders of the two motivational patterns, it produces different reactions to feedback. Negative feedback with an ability goal orientation is more likely to be associated with the “Me”-self and therefore necessitate strategies to restore or protect self-esteem. This pattern is also evident in studies manipulating theory of mind, specifically, whether intelligence were malleable or static characteristics. “Incremental” mindset means believing in a changeable flexible intelligence while believing in a fixed intelligence was called “entity” mindset (Nussbaum & Dweck 2008). These two groups

experience either enjoyment or anxiety in the face of challenge, respectively. Nussbaum & Dweck (2008) investigated how people maintain and repair self-esteem and manipulated the participants into holding these respective mindsets in reference to their own intelligence. These studies revealed that individuals that were manipulated into holding an entity view were more likely to apply defensive strategies in order to restore self-esteem than the incremental oriented individuals. These studies were consistent with earlier studies that manipulated self-focused attention in high and low test-anxious individuals (Carver et al., 1983). Solving anagrams in a setting inducing self-focus had an aversive effect on test anxious individuals, but a performance improving effect in low anxious subjects. Setting outcome goals may lead to feedback being interpreted at a more general level, this is supported by the fact that the group that used outcome goals attributed their performance to ability (Zimmerman & Kitsantas, 1997). These studies support the notion that less ego-involved students are to a greater degree able to persist in the face of obstacles than more ego-involved students (Grant & Dweck, 2003; Nussbaum & Dweck, 2008).

Students that tend to process emotional information in a self-referenced or ego involved manner may avoid situations where self-critical feedback are a high probability or they may be unable to take in and use this feedback for self-improvement. Students avoid situations where there is danger of negative feedback, it will also be less useful for them, as they most likely will be more inhibited in such situations. As a result they will generate less feedback than students that are less afraid of negative feedback.

2.6 Summing up

Mindfulness is a state where present experiences are approached in a non-judgmental manner. Research conducted supports the notion that the affective qualities associated with the mindfulness state allows for greater range of experiences into consciousness (Bishop et al., 2004). One of the suggested mechanisms is that mindfulness allows for greater awareness of where automatic impulses stop, and further elaboration and rumination begin (Williams, 2010). Therefore, volitional aspects are emphasized and narrative selves are set more in the background. One consequence is the reduction of strategies aimed at avoiding aspects of experiences that would otherwise threaten the self. The ability to relate to one's thoughts and emotions mindfully may in these contexts (i.e., where negative emotions hamper one from seeing the present moment) be adaptive. It is suggested that information are more decoupled

or decentred from themselves, thereby allowing students to process potential threatening information more fully. This is concurrent with research conducted by Dweck, (1986) and Grant and Dweck (2003) whom suggested that ego-involved students use more defensive strategies for self-esteem maintenance. Previous studies have found that mindfulness may improve aspects of attention, regulate emotions and facilitate the intention behaviour relationship (Jah et al., 2007; Ortner et al., 2007; Chatzisarantis & Hagger, 2007). It is therefore suggested that students that are more mindful may be able to stay on task and to follow through with their study plan and consequently develop more productive study habits than less mindful students.

2.7 Main aim of thesis

The main aim of this thesis was to investigate the relationship between mindfulness and self-regulated learning. It was hypothesized that mindfulness would be positively related to self-regulated learning, measured as students learning strategies, test anxiety and goal setting.

2.8 Specific aim of paper one

The aim of the first paper was to test the psychometric qualities of the FFMQ, including the association between mindfulness facets and self-regulated learning. These scales consisted of the “Five Facet Mindfulness Questionnaire” (FFMQ), the strategy section and the affective section of the “Motivated Strategies for Learning Questionnaire” (MSLQ) and a sample consisting of 13 items from Locke and Latham goal-setting questionnaire, originally consisting of 45 items.

2.9 Specific aim of paper two

The aim of the second paper was to investigate mindfulness tendencies within the student population and how these tendencies were related to self-regulated learning. Previous studies have found that the dimensions within mindfulness were differently associated with each other depending upon meditation experience (Bear et al., 2006; 2008).

3. METHOD

3.1 Sample

The study was a self-report questionnaire with a response rate of 41% and consisted of 346 students from the “Norwegian University of Science and Technology” NTNU. Woman = 247, Men = 97, 6 did not specify gender. Students age under 21 = 124, 21-24 = 151, 25-29 = 48, and 30+ = 21. 253 students have studies between 1-6 semesters, 59 have studied between 7-10 semesters and 30 students have studied 11 semesters or more.

3.2 Instrument

The instrument consisted of demographical information, specifically, gender, age, attachment (i.e., either to humanistic or technical faculties), semester studied, and estimation of average hours studied per week. Age was measured on a four point scale, below 21 years old, between 21 and 24 years old, between 25 and 29 years old and 30 and above. Education was measured by number of semesters studied. Attachment and the estimation of average hours studied per week were omitted because it was considered irrelevant to the thesis question. The instrument used consists of a the “Five Facet Mindfulness Questionnaire” (FFMQ), the strategy section and the affective scale of the motivational section from the “Motivational Strategies for Learning Questionnaire” (MSLQ), and a sample of 13 items from Latham and Locke, (1990) goal setting questionnaire, originally consisting of 45 items. These instruments were in this investigation measured using a 5-point type of Likert scale from never or very rarely true to very often or always true.

3.2.1 (FFMQ) “Five Facet Mindfulness Questionnaire”

Attempts at measuring mindfulness conceptualized mindfulness either as a multi-dimensional construct or as a one-dimensional construct. This empirical investigation was based on the “Five Facet Mindfulness Questionnaire” (FFMQ), a multi-dimensional construct developed by Bear et al. (2006). The FFMQ is a 39 item questionnaire and taps into five broad dimensions, non-reaction, non-judgment, observation, description, and an awareness scale.

(1)“Observing” includes noticing or attending to external and internal stimuli, such as sensations, cognitions, emotions, sights, sounds and smells (i.e., being attentive to how food influences the body, or emotions influences thoughts and behavior, and attention to sensation

such as the feeling of wind and sun on the body or the smell of things). In MBSR the clients are encouraged to pay attention their sensations, such as duration, location or intensity (Kabat-Zinn, 1990). (2) “Describing” refers to the extent one labels internal experience with words (e.g., I can easily put my beliefs, opinions, and expectations into words *and* It’s hard for me to find the words to describe what I’m thinking). (3) “Acting with Awareness” facet refers to the attention one has towards activity in the moment as opposed to having mechanistic or unconscious actions. All the items in the “acting with awareness” facet are reversed (e.g., I rush through activities without being really attentive to them *and* It seems I am “running on automatic” without much awareness of what I’m doing). (4) “Non-judging” facet has to do with the degree one tends towards a non-evaluative stance towards one’s own thoughts and feelings (i.e., allowing them to stay the way they are without attempting to avoid or escape or change them) (Bear et al., 2004). All the items from this facet are also reversed (e.g., I criticize myself for having irrational or inappropriate emotions *and* I disapprove of myself when I have irrational ideas). (5) “Non-reactivity” facet consists of a tendency to allow thoughts and feelings to come and go without being caught up or carried away by them (e.g., Usually when I have distressing thoughts or images, I feel calm soon after *and* I watch my feelings without getting lost in them). FFMQ is measured on a five point type of Likert scale from not at all true “slett ikke sant” to very true “svært sant”.

3.2.2 (MSLQ) “Motivated Strategies for Learning Questionnaire”

The MSLQ has been extensively tested and developed from 1986 and show positive associations with academic performance (Pintrich et al., 1993). The original MSLQ consists of two main scales, a motivation section and a learning strategy section (Pintrich et al., 1993), however, only test anxiety (e.g., thinking about consequences of failure *or* getting emotionally upset while taking tests) from the motivational section was included in this investigation. The entirety of the strategy section was included in this investigation. The strategy section consists of three sub-scales, cognitive strategies, meta-cognitive self-regulative strategies, and resource management strategies.

The learning strategy section consisted of simple strategies such as rehearsal (i.e., repetition or reciting names and lists to be learned), more complex strategies like elaboration (e.g., summarizing, paraphrasing, creating analogies and note taking) and organization (e.g., clustering, outlining, or selecting main ideas) strategies, as well as critical thinking (i.e.,

applying previous knowledge in new situations or evaluate ideas). The meta-cognitive self-regulation section is a 12 item scale and includes planning, monitoring and regulation. Planning involves goal setting and task analysis, monitoring refers to the tracking of attention while reading, self-testing, and questioning. Regulation refers to the tuning and adjustment of cognition to the activity (Pintrich et al., 1991; Pintrich & De Groot, 1990). The third scale is called resource management strategies and consists of four subscales. Time and study environment scale includes the ability to manage time and study environment (e.g., scheduling, planning), effort regulation consists of the ability to regulate effort (e.g., persist in spite of difficult or boring tasks), peer learning (i.e., using friends or study group to help learn) and help seeking (i.e., eliciting help from peers or instructors when needed *and* collaborating with friends) (Pintrich et al., 1993; Pintrich et al., 1991). The original MSLQ was scored on a 7 point type of Likert scale from (not at all true of me) to (very true of me), a 5 point type of Likert scale is here used to keep it consistent with the FFMQ and the goal-setting scale.

3.2.3 Goal-Setting

The original goal setting questionnaire from Locke and Latham (1990) consisted of 45 items, and was developed to fit a work context. Consequently, some items were therefore a poor fit in a university learning context. The sample of questions used was therefore adapted to fit a learning university context. In order to keep the questionnaire at manageable size, only 13 of the 45 items were selected. Questions can roughly be categorized as either finding goals to difficult, stressful, or failure to reach goals on the one hand (e.g., My goals are much too difficult *and* I often fail to attain my goals) and questions that taps into knowing what to do, and knowing how accomplishment are measured (e.g., I understand exactly what I am supposed to do in my studies *and* trying for goals makes my studies more fun than it would be without goals).

3.3 Procedure

The MSLQ, the FFMQ and the goal-setting items were first translated to Norwegian then back to English by two separate students. Discrepancies between the two translations were addressed by trying to find the best match between the original version and the closest match in Norwegian. The goal setting items were translated and adapted to fit a learning context and

the goal setting questionnaire to Locke and Latham (1990) was originally developed for work context.

3.4 Data analysis

Dimensional structure of the 39 item FFMQ and the 13 item goal setting scale were ascertained by exploratory factor analysis with direct oblimin rotation to allowing for correlation between dimensions. Dimensional structure of the strategy learning questionnaire was not performed due to insufficient sample size. Rule of thumb says that sampling size should be at least 10 for each item in a questionnaire. The MSLQ was originally measured with a 7 point scale. To keep it consistent with the FFMQ and the goal setting scale the MSLQ was also measured with a 5 point type of Likert scale.

Reliability was calculated and correlation structure between the indices was performed. Chronbach Alpha coefficients and average total item correlation were used to evaluate the reliability. Correlations coefficients were used to test internal consistency and discriminant validity. Correlation analysis was conducted between the mindfulness items, the learning strategy items, the goal setting items and test anxiety. The 5 point type of Likert scale was further divided into three equal parts and distribution scores were calculated. In order to find the groups within the mindfulness scores a hierarchical cluster analysis was conducted and based on the agglomeration schedule K-mean cluster was conducted. MANOVA was conducted using the clusters as independent variable and the learning strategies, test anxiety and goal setting scales as dependent variables. Gender, age and education were set as covariates.

4. RESULTS

4.1 The results of paper one

The psychometric data from the FFMQ showed that dimensional structure with five dimensions to be a good fit. All items loading its strongest consistent with FFMQ and previous results (Bear et al., 2006). The items that belonged to each facet loaded strongest in its' respective dimension and indicated good factor structure and reliability. Cronbach Alpha

for the total 39 item FFMQ scale was .83 and the total variance explained for the five facet solution was 51%. Alpha coefficients for the individual facets ranged from (.69 to .93.) .91 nonjudgmental, .70 non-reaction, .93 describing, .69 for observing and .80 for the awareness facet. These results were consistent with earlier finding with alpha coefficients ranging from .75 to .91 (Bear et al., 2006). Correlations between the mindfulness dimensions showed a weak to moderate correlation between the facets. If the correlations are too strong they may indicate that the dimensions are better conceptualized as one dimension, however, too weak or uncorrelated dimensions may indicate that the dimensions belong to different underlying constructs. The negative correlation between observing and non-judgment in this paper was consistent with previous findings in a non-meditative sample (Bear et al., 2006).

Psychometric data of the MSLQ showed majority of the indices Chronbach alphas above .70, indicating good reliability, but with some exceptions. Organizational strategies, effort regulation and rehearsal have an alpha of .675, .646, and .629, respectively. Research carried out previously has found that the cognitive strategies and resource management scales are positively associated and that test anxiety was negatively associated to the cognitive, meta-cognitive and resource management scales (Pintrich et al., 1993). These previously reported results by Pintrich et al. (1993) were consistent with results in this current study.

Dimensions in the goal setting scale with exploratory factor analysis and direct oblimin rotation revealed the goal setting scale to consist of two dimensions. Items that were negative indicators of goal performance loaded together and items that were positive measurements of goal setting loaded together. Results showed satisfactory Chronbach alpha and inter-item correlation for the two indices and a weak to modest significant negative correlation between the dimensions $-.20^{**}$ with significance at $^{**} = p < .01$.

The dimensions of the FFMQ were mostly positively associated with cognitive strategies, meta-cognitive self-regulation strategies, and with resource management strategies. The FFMQ was positively associated with goal accomplishment and negatively associated with goal dissatisfaction. Dimensions of the FFMQ were mostly negatively correlated with test anxiety, except for observation which correlated positively with test anxiety.

4.2 The results of paper two

Hierarchical cluster analysis revealed a three cluster solution and a mean comparison along the five mindfulness dimensions showed three cluster patterns. Members of cluster 1 had low scores on describing and observing facets and an average, around mean score on non-judgment and non-reaction. This indicated that this cluster have little self-focused attention and were little reactive or non-judgmental towards these inner experiences. Members of cluster 2 were characterized by high scores on observing and on describing facets, indicating a tendency to self-observe or self-focus. These scores were combined with a high non-judgment score and an average non-reaction score, showing that they tend not to evaluate whether their thoughts and/or feelings are good or bad. Members of cluster 3 were characterized by above average scores on observing and describing, showing a tendency to self-observe or self-monitor their thoughts. Members of cluster 3 were furthermore associated with low scores on non-judgment and non-reaction showing a tendency to evaluate their thoughts badness or goodness.

Members of cluster 2 seemed to embody the most favourable pattern in terms of impact on self-regulated learning components. Members of this cluster were very little test anxious, used consistently more learning strategies and were more goal directed than the two other clusters. Members of cluster 3 were much more test anxious than member of the other two clusters, but reported slightly more cognitive learning strategies usage than members of cluster 1. Cluster 1 was the least self-focused, but scores relatively higher non-judge and non-reactive. In terms of cognitive strategies, meta-cognitive self-regulation strategies and resource management strategies members of cluster 1 tended to follow the same pattern as cluster 3, but differed primarily by their low test-anxiety scores.

MANOVA analysis revealed a significant difference between the clusters $\Lambda = .71$, $F = (24,63) = 4.95$, $p < .0005$, and an interaction effect between gender and the dependent variables $\Lambda = .81$, $F = (12,31) = 6.80$, $p < .0005$. A closer investigation using ANOVA revealed a significant difference between the clusters on every dependent measure (Table 3, index). Test anxiety, organization, elaboration, meta-cognitive self-regulation, time and study environment, effort regulation, goal accomplishment and goal dissatisfaction were significant at $p < .0005$. Critical thinking, peer learning and help seeking were significant at $p < .01$. Rehearsal was significant at $p < .05$ level. A further discriminate analysis between gender and the dependent variables

revealed a strong significant result between gender and test anxiety $F=16.95$, organization $F=13.65$ and critical thinking $F=22.90$ with $p<.0005$.

5. DISCUSSION

The results showed that mindfulness was associated with self-regulated learning. Inter-correlations between the indices showed that the mindfulness dimensions were associated with learning strategies, goal accomplishment and negatively associated with test anxiety and goal dissatisfaction. Cluster analysis showed that the members of cluster 2 used more learning strategies, were less anxious for test taking and more goal accomplished, compared with the two other clusters. This showed that the combination of self-focused attention and attitudes of non-judgment and non-reaction, which also characterizes members of cluster 2, may be conducive to self-regulative learning. The present study suggests that they would be better able to selectively act on their inner experiences. This was consistent with studies conducted on students that are “ability” oriented and students that are mastery oriented (Dweck, 1986). Dweck suggested that students that were oriented to prove their ability used more defensive strategies, like avoidance and distractions in face of setbacks. Previous studies also support that students that are more mindful were better at following through with their intention (e.g., Chatzisarantis & Hagger, 2007).

Not all facet of mindfulness were significantly positively associated with self-regulated learning. The observing dimension was only significantly positively associated with cognitive strategies. The observing index was negative correlation with non-judgment. It is therefore suggested that students that tend to observe their inner experiences judgmentally, may tend towards covert strategies. This is consistent with cluster analysis showing that cluster 3 used slightly more cognitive strategies than cluster 1, but not social strategies like peer learning and help seeking. Research conducted previously has shown that when anxious individuals become self-focused they fail to utilize cues in their environment that could have helped them (Carver & Scheier, 1983).

The results showed a negative association between observing and non-judgment. This result was consistent with previously reported correlations (Bear et al., 2006). Bear et al. (2006) showed that individuals without meditation experience would tend not to differentiate

between observing their inner experience and evaluating these. Non-judgment, as it is measured by the FFMQ, taps into a general level of evaluation, for example whether one tends to judge the goodness or badness of thoughts and emotions. A low non-judgment score may tap into a tendency to identify with one's thoughts and feelings. Studies conducted on students learning behaviour have found that over-identification with one's own thoughts and feelings are associated with maladaptive patterns of learning behaviour (Dweck, 1986). Dweck differentiated between ego involved students and mastery oriented students. The former attributed their performance to ability the latter attributed their performance to lack of effort or choice of strategy. These ways of processing feedback gives rise to different ways of maintaining or strengthening self-esteem. Carver and Sheier (1983) suggested that self-focused and anxious individuals may retreat covertly from task, when overt avoidance was unavailable. Students that were unable to differentiate between information and their emotional reactions towards information may fail to utilize available cues or use strategies to control their progress. Cluster profiles showed that the members of cluster 3 were self-focused, but also judgmental towards inner experience. Consistent with this view, members of cluster 3 was the most test-anxious. Members of this cluster were little goal accomplished, used less strategies and were the most dissatisfied with goals.

Carver et al., (1983) suggested that test anxiety measured fear of being evaluated by others. Seeking approval of others may generate more general judgments, such as whether aspects of one-self is good or bad, rather than specific information, such as whether strategies or information are useful or not. Test anxiety may therefore overlap negatively with the non-judgment facet of mindfulness. Members of cluster 3 had a high observing score and a low non-judgment score. The correlation study showed that observing was positively associated with test anxiety and that non-judgment was negatively associated with test anxiety. These results seem to fit with cluster 3s' score on test anxiety. Members of cluster 3 also used less learning strategies compared with cluster 2. Members of cluster 3 may access more general descriptions of their experiences. Feedback or processing information at a more general level of judgement or at a more abstract may not be conducive to self-regulation or self-regulated learning.

The main difference between cluster 3 and 2 was cluster 2's attitudes towards their inner experiences. Members of cluster 2 were characterized by self-focused attention, but had also a high non-judgment score. Self-focused attention combined with attitudes of non-judgment and

non-reaction has been found to regulate affect (Wilkins & Teasdale, 2004) and producing persistence in the face of obstacles (Evans et al., 2009). Members of cluster 2 used consistently more learning strategies, they were more satisfied by their goals, and they had the lowest test anxiety score. These results showed that self-focused attention combined with non-judgment and non-reaction towards inner experience was conducive to self-regulated learning. Students that were self-focused, but judging of inner experience or students that were less self-focused scored lower on learning strategy usage, they were less goal accomplished and scored higher on test anxiety. A combination of both self-focused attention and affective qualities associated with mindfulness were conducive to self-regulated learning. Previously conducted studies have found similar patterns of results. Self-focused attention has been associated with both adaptive and mal-adaptive regulation. For example have Carver et al. (1983) found that self-focus may impede performance in anxious individuals, but facilitate performance in non-anxious individuals.

Gender was found to be significantly related to test anxiety and critical thinking. However, there was a significant difference in the gender distribution between the clusters. The biggest difference in gender distribution was between cluster 1 and the two other clusters. The ratio in cluster 1 between males and females were 4 to 6 respectively, while that ratio were about 2 (male) to 8 (female) in cluster 2 and 3. In combination with the MANOVA these results indicate that cluster 1 may have been less anxious because of the male to female ratio. Although females may be more test anxious than males, the ratio between members of cluster 2 and 3 were comparably equal. That cluster 3 scored higher on test anxiety may therefore most likely be attributed to cluster profiles.

Why should mindfulness meditation or students with increased mindful awareness influence their use of learning strategies? Mindfulness increases the awareness of present moment experiences and promotes the “mindful” exploration of inner mental states, such as emotion and cognition. Bringing cognition and emotion into conscious awareness may allow for a greater range of experience into consciousness and for increased mental flexibility. It is suggested that this may allow for the tuning and the adjustment of the affective and cognitive system into functionally more complex and adaptive mental states. Students that are more mindful may be able to make more complex states of mind that are functionally better than students that are less aware of their mental states, or less mindful.

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PAPER 1:

**PSYCHOMETRIC QUALITIES OF
THE FIVE FACET MINDFULNESS QUESTIONNAIRE**

Master's Thesis in Social and Community Psychology

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ABSTRACT

The aim of this paper was to test the psychometric qualities of the Five Facet Mindfulness Questionnaire (FFMQ). The self-report questionnaire's response rate was 41% and consisted of 346 students from the Norwegian University of Science and Technology (NTNU). The questionnaire consists of a Norwegian translation of the "Five Facet Mindfulness Questionnaire" (FFMQ) [(Baer, R. A., Smith, G. G., Hopkins, J., Krietemeyer, J. & Toney, L. (2006). Using Self-Report Assessment Methods to Explore Facets of Mindfulness. *Assessment*, 13(1), 27-45.)], the strategy section and test-anxiety subscale from the motivational section of "Motivational Strategies for Learning Questionnaire" (MSLQ) [(Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ). Non-Journal item.)], and a goal setting scale. Dimensional structure and reliability on the mindfulness questionnaire and on the goal-setting scale were tested. Reliability from the MSLQ questionnaire was tested. The results showed satisfactory reliability of the scales used, consistent with earlier findings. The dimensional structure for the FFMQ was inter-correlated. A negative correlation between the observing and the non-judgment dimensions was found, consistent with previously reported findings by Bear. Inter-correlations between facets of mindfulness and self-regulation learning showed that test anxiety was positively correlated with observing, but negatively correlated with 3 of the other facets. These results were consistent with the notion that observing inner experiences judgmentally, may be anxiety promoting. Correlation between the mindfulness facets and self-regulated learning revealed weak but significant correlations between mindfulness, goal setting and learning strategies.

1. INTRODUCTION

Mindfulness has origins from Buddhist spiritual practice and can be compared with a state of mind, facilitated through meditation, that cultivation inner peace or insight into one's own mind (Kabat-Zinn, 1990). However, the introduction of mindfulness into psychology is a relatively new endeavor. Mindfulness is increasingly implemented and adapted as part of different therapeutic treatments, among those, the most known may be Mindfulness-Based Stress Reduction (MBSR) and Mindfulness Based Cognitive Therapy (MBCT).

Kabat-Zinn (2006) defined mindfulness as *“the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment”*. Kabat-Zinn (2006) characterized mindfulness as taking a step back from content of consciousness and observing sense stimuli as they occur without evaluating their goodness or badness. Thoughts and feelings are to be observed as passing mental events, rather than to be engaged, analyzed or ruminated over (Kabat-Zinn, 2006). Bishop et al. (2004) identified two key mechanisms of mindfulness. *“The firstly component involves the self-regulation of attention so that it is maintained on immediate experience, thereby allowing for increased recognition of mental events in the present moment. The second component involves adopting a particular orientation towards one's experiences in the present moment, an orientation that is characterized by curiosity, openness, and acceptance”*.

A paradox is that mindfulness may seem to be diametrically opposite to states of mind characterized by self-regulated learning. Self-regulated learning is about reaching goals, analyzing, making strategies, monitoring of progress and adaptive regulation of behavior to keep attention on track. Mindfulness on the other hand, is pre-conceptual (Bishop et al., 2004; Williams, 2010). Mindfulness is characterized by observing, but not evaluating, it focuses on the present moment, not the future. There is no goal and no future perspective to think about, but focuses on the present moment. This non-evaluative mode or state is often contrasted with a goal oriented mode of processing, where mental processes are actively engaged in problem solving (Segal et al., 2002; Williams et al., 2007). These two modes are by different researchers referred to as “Being” mode and “Doing” mode (Williams et al., 2007; Segal et al., 2002). Williams (2010) describes mindfulness as a sensory perceptual mode of

processing, and contrasts this with a verbal conceptual mode of processing. “Doing” mode or the conceptual mode is about setting goals, planning ahead, labeling, analyzing, comparing and judging, remembering and self-reflection. Processing power is used to monitor discrepancies between the actual states and desired states (Segal et al., 2002; Williams, 2010). “Being” mode or sensory conceptual mode is about seeing, tasting, touching, hearing, smelling and generally taking in information from the body. Processing power is used to take in and notice sensations, thoughts and feelings in the present moment (Williams, 2010).

It is suggested these two ways of processing corresponds to two different self-systems, specifically, one linking experiences across time and one centered in the present moment (Farb et al., 2007). Farb et al. (2007) argued that these self-systems may be habitually integrated in awareness, but could be differentiated through mindfulness attention training. Specifically, it is our ability to think about the future and bring that new knowledge into the present that have made a competitive edge in our evolution (Williams, 2010). In the context of treatments of stress and anxiety, these emotions may be active in the present moment where they no longer serve the same function as it once did. For example may thinking about experiences in the past activate their associated emotions inhibit productive adaptation. For example Williams (2010) writes that remembering past loss or humiliation may create these emotions in the present. However, this also holds true for positive emotions.

“Mindfulness may improve ability to see where automatic reactions stop and further elaboration begin” (Bishop et al., 2004). Several researchers and studies support the notion that mindfulness reduces further elaboration and rumination (e.g., Watkins & Teasdale, 2004). Basically, in mindfulness meditation, one sits with an upright posture cross-legged and attempts to keep attention on whatever external or internal sensation, somatic sensation, of one’s choice, typically the breath (Bishop et al., 2004). In MBSR the client is instructed to focus attention on their present moment experience and to refocus attention when it drifts using the breath as an anchor. Intrusive thoughts’ that enters awareness are registered, but not engaging or elaborating on (Kabat-Zinn, 1990). Present moment exploration and the returning attention back to the present may produce increased awareness of when one is in which mode (Being / Doing) and increased ability to shift between these modes (Bishop et al., 2004).

Different skills have been identified produced in mindfulness training, such as, observing, describing, act with awareness and accepting (Bear et al., 2004). “Observing” involves

attention towards a variety of stimuli, such as cognition, emotion, sounds and smell, texture, touch, the location, intensity and pitch of sound. “Describing” involves labeling, describing and covertly applying words to observed phenomenon, but encouraged to use non-judgment, not judgmental labels (e.g., It is stupid to feel this way). Both the observing and describing involved an attention towards internal experiences and may therefore be compared with a kind of self-focused attention. Another skill involves “accepting (or allowing) without judgment”. This skill involves refraining from applying evaluative labels like good or bad, right or wrong, worthless or worthwhile. It is meant to discourage automatic, impulse behaviors, by allowing the present to be as it is, and is often combined with observing and describing (Bear et al., 2004). These skills are consistent with mechanisms that Bishop et al. (2004) identifies with mindfulness. These skills may reduce the need to avoid aspects of experiences (Bishop et al., 2004). A forth mindfulness Bear et al. (2004) identified with mindfulness is “Acting with awareness”. This skill involves doing something with undivided attention, such as washing dishes, driving, and cleaning. “Acting with awareness” is often contrasted with acting on “automatic pilot”. In FFMQ this skill is measured negatively (e.g., I am easily distracted) (Bear et al., 2004; 2006). The awareness facets can therefore be conceptualized as a tendency not to escape the present moment experience or engage in avoidance behaviour. Awareness facet may therefore be a product of these two other characteristics of mindfulness which Bishop et al. (2004) identified.

One of the reasons why mindfulness training may be productive is because approaching present moment experience with an attitude of non-judgment may reduce the need to avoid aspects of experience that are uncomfortable or unacceptable (Bishop et al., 2004). For this same reason students that are more mindful may tend to use less avoidance strategies and to approach their learning environment to a greater degree than students that are less mindful. Consistent with this reasoning are findings by Carver et al. (1983) showing that anxious individuals tend to withdraw from task when they are induced to be self-focused. Mindfulness is implemented in the treatment of anxiety. This suggests that mindfulness states by be conductive to reducing avoidance behavior.

1.1 Aim of paper

The aim of this paper was to test the psychometric qualities of the “Five Facet Mindfulness Questionnaire” (FFMQ) (Bear et al., 2006) and the association between mindfulness and self-regulative learning aspects, such as learning strategies, goal setting and test anxiety.

1.2 Prediction

The FFMQ have previously found to be positively inter-correlated (Bear et al., 2006). Previous studies have indicated a negative association between the observing facet and the non-judgment facet in individuals without meditation experience (Bear et al., 2006). It was expected that previous finding would be replicated. In addition mindfulness indices were predicted to be negatively correlated with test anxiety and positively associated with engagement with the learning context.

2. METHOD

2.1 Sample

The sample consisted of 346 university students from the Norwegian University of Science and Technology (NTNU). Response rate was 41 %. 247 were female 97 were men, 6 did not specify gender. 124 students were below 21 years old, 151 students were between 21 and 24, 48 students were between 25 and 29, and 21 were 30 years old or older. 253 students have studies between 1-6 semesters, 59 have studied between 7-10 semesters and 30 students have studied 11 semesters or more.

2.2 Procedure

The items were originally in English and therefore had to be translated. The instrument used was translated to Norwegian by two independent students. Discrepancies between the two translations were addressed by trying to find the best match with the original questionnaires. The data was collected using self-report questionnaires measured on a five point type of Likert scale from not true to very true of me. The questionnaires were collected from a first year psychology courses, a philosophy lecture, and from a sociology lecture. Students also had the opportunity to pick up and deliver the questionnaires at the humanistic and technical libraries, as well as in the psychological faculty reception.

2.3 Measurements

2.3.1 Five Facet Mindfulness Questionnaire (FFMQ)

Attempts at measuring mindfulness have conceptualized mindfulness as a uni-dimensional construct and as a multi-dimensional construct. The FFMQ is a measurement of Mindfulness developed by Bear et al. (2006; 2008) that is based upon five previously developed mindfulness questionnaires, these measurements of mindfulness includes The Freiburg Mindfulness Inventory (FMI), Mindfulness Questionnaire (MQ), The Kentucky Inventory of Mindfulness Skills (KIMS), Mindfulness and Attention Awareness Scale (MAAS), and the Cognitive and Affective Mindfulness Scale (CAMS). The FFMQ consists of 39 items extracted from the total item pool of these five questionnaires and consists of 5 dimensions with 7 items on the non-react facet and 8 items each on the other facets (Bear et al., 2006).

The Five Facet Mindfulness Questionnaire (FFMQ) borrows heavily from KIMS (Bear et al., 2004). 24 Items from KIMS are also included in FFMQ. The FFMQ have previously found to be negatively associated against other psychological measurements, such as neuroticism, thought suppression, dissociation, absent – mindedness, experiential avoidance, and positively associated with extraversion, openness to experience, emotional intelligence, self-compassion and meditation experience (Bear et al., 2006; 2008). The FFMQ is a 39 item questionnaire, measured on a five point type of Likert scale from not at all true to very true. The respondents were to answer questions of whether they agree with the statements or to what degree they viewed the statements as accurate descriptions of themselves. The FFMQ measures mindfulness as a five dimensional construct; non-reaction, non-judgmental, observing, describe and awareness.

(1)“Observing” includes noticing or attending to external and internal stimuli, such as sensations, cognitions, emotions, sights, sounds and smells (i.e., being attentive to how food influences the body, or emotions influences thoughts and behavior, and attention to sensation such as the feeling of wind and sun on the body or the smell of things). In MBSR the clients are encouraged to pay attention their sensations, such as duration, location or intensity (Kabat-Zinn, 1990).

(2) “Describing” refers to the extent one labels internal experience with words (e.g., I can easily put my beliefs, opinions, and expectations into words *and* It’s hard for me to find the

words to describe what I'm thinking). This is however done non-judgmentally, without diving into the conceptual mode of processing (Bear et al., 2004).

(3) "Acting with Awareness" facet refers to the attention one has towards one's activity in the moment as opposed to having mechanistic or unconscious actions. All the items in the awareness facet are reversed (e.g., I rush through activities without being really attentive to them *and* It seems I am "running on automatic" without much awareness of what I'm doing).

(4) "Non-judging" facet has to do with the degree one tends towards a non-evaluative stance towards one's own thoughts and feelings and by allowing them to stay the way they are without attempting to avoid or escape or change them (Bear et al., 2004). All items from this facet are reversed (e.g., I criticize myself for having irrational or inappropriate emotions *and* I disapprove of myself when I have irrational ideas).

(5) "Non-reactivity" facet consists of a tendency to allow thoughts and feelings to come and go without being caught up or carried away by them (e.g., Usually when I have distressing thoughts or images, I feel calm soon after *and* I watch my feelings without getting lost in them).

2.3.2 (MSLQ) "Motivated Strategies for Learning Questionnaire"

The MSLQ consists of two main scales, a motivation section and a learning strategy section and show associations with academic performance (Pintrich et al., 1993). Only the affective scale from the motivational section, which is measured with test anxiety (e.g., thinking about consequences of failure *or* getting emotionally upset while taking tests) was included in this investigation. The entirety of the strategy section was included in this investigation, and consisted of three sub-scales cognitive strategies, meta-cognitive self-regulative strategies, and resource management strategies.

The learning strategy section consisted of simple strategies such as rehearsal (i.e., repetition or reciting names and lists to be learned) and more complex strategies like elaboration (e.g., summarizing, paraphrasing, creating analogies and note taking) and organization (e.g., clustering, outlining, or selecting main ideas) strategies, as well as critical thinking (i.e., applying previous knowledge in new situations or evaluate ideas). The meta-cognitive self-regulation section is a 12 item scale and includes planning, monitoring and regulation.

Planning involves goal setting and task analysis, monitoring refers to the tracking of attention while reading, self-testing, and questioning. Regulation refers to the tuning and adjustment of cognition to the activity (Pintrich et al., 1991; Pintrich & De Groot, 1990). The third scale is called resource and management strategies and consists of four subscales. Time and study environment scale includes the ability to manage time and study environment (e.g., scheduling, planning), effort regulation consists of the ability to regulate effort (i.e., persist in spite of difficult or boring tasks), peer learning (i.e., using friends or study group to help learn) and help seeking (i.e., eliciting help from peers or instructors when needed, collaborating with friends) (Pintrich et al., 1993; Pintrich et al., 1991). The original (MSLQ) were scored on a 7 point type of Likert scale from “not at all true of me” to “very true of me”. To keep it consistent with the FFMQ and the goal-setting measurements a 5 point type of Likert scale was used.

2.3.3 Goal-Setting

The original goal setting questionnaire from Locke and Latham (1990) consisted of 45 items and was developed to fit a work context. Consequently, some items may be poor fit in a learning context. The sample of items used was therefore adapted to fit a learning university context. In order to keep the questionnaire at manageable size, only 13 of the 45 questions were selected. Questions can roughly be categorized as either finding goals to difficult or stressful (e.g., My goals are much too difficult *and* I often fail to attain my goals), and questions that taps into knowing what to do or positive experiences with goal behavior (e.g., I understand exactly what I am supposed to do in my studies *and* trying for goals makes my studies more fun than it would be without goals) (Table 6).

2.4 Statistical analysis

Exploratory factor analysis with direct oblimin rotation to allow for correlation between factors, were performed on the 39 item mindfulness questionnaire and the 13 item goal setting questionnaire. Due to insufficient sampling the dimensional structure of the learning strategy section of the MSLQ was not performed. Rule of thumb states that sample size should be 10 for each item. In order to check whether the translated items were consistent with the FFMQ by Bear et al. (2006) a second factor analysis was conducted asking specifically for five factors. Indices were calculated from the items that loaded together. The original indices from the MSLQ were used. Reliability analysis was conducted and Chronbach Alpha coefficients

and average item total inter-correlation were used to evaluate the internal consistency of the items belonging to the extracted factors. Bivariate analysis of variance was calculated internally within each index and between indices. Distribution scores and skewedness were calculated by dividing the five point scale into three equal parts and comparing the percent distribution scores on this altered three point scale.

3. RESULTS

3.1 FFMQ

Factors were first extracted using direct oblimin analysis to allow for correlation between factors, with Eigenvalue 1 as extraction criteria. This analysis revealed an eight factor structure. Some of the items in the eight dimensions loaded together, consistent with previous reported item loadings (Bear et al., 2006). Items from the original facets non-judgment and describing loaded also together in the eight factor solution, while items that make up the non-reaction facet in the original questionnaire had only one item that loaded differently. The original awareness and the observant facet of FFMQ were in the eight factor solution divided into two and three factors respectively (Table 1, Appendix). That the items that make up the different dimensions according to Bear et al. (2006) also loaded together in this exploratory factor analysis may indicate that the items are reliable. A second factor analysis was conducted, asking specifically for five factors and using oblimin rotation. The original mindfulness dimensions developed by Bear et al. (2006) was this time replicated (Table 1).

The results revealed that the respective 39 items from the “Five Facet Mindfulness Questionnaire” (FFMQ) loaded strongest at their respective dimensions, consistent with the original (FFMQ) (Bear et al., 2006). Cronbach Alpha for the total 39 item FFMQ scale was .83 and the total variance explained for this five facet solution was 51%. Alpha coefficients for the individual facets ranged from (.69 to .93.) .91 nonjudgmental, .70 non-reaction, .93 describing, .69 for observing and .80 for the awareness facet. These were consistent with earlier finding by Bear et al. (2006) with alpha coefficients ranging from .75 to .91.

TABLE 1: Dimensional structure of mindfulness

	1	2	3	4	5
DESCRIBING (Alpha .927) & (Average item-total inter correlation .76)					
28. I can easily put my beliefs, opinions, and expectations into words	.91	.05	.09	-.16	-.08
5. I am good at finding words to describe my feelings	.88	.04	.06	-.11	-.13
30. I can usually describe how I feel at the moment in considerable detail	.83	.06	.16	-.17	-.11
29. Even when I am feeling terribly upset, I can find a way to put it into words	.83	.08	.06	-.19	.01
14. I have trouble thinking of the right words to express how I feel about things	.83	.15	-.09	-.23	-.05
36. It is hard for me to find the words to describe what I am thinking	.77	.11	-.03	-.22	-.05
21. My natural tendency is to put my experiences into words	.73	.00	.21	-.03	-.11
6. When I have a sensation in my body, it's hard for me to describe it because I can't find the right words	.69	.17	-.14	-.20	-.04
NONJUDGMENT (Alpha .911) & (Average item-total inter correlation .71)					
37. I tell myself I shouldn't be feeling the way I am feeling	.11	.86	-.09	-.24	.12
31. I tell myself I shouldn't be thinking the way I'm thinking	.01	.85	-.05	-.20	.09
38. I think some of my emotions are bad or inappropriate and I shouldn't feel them	.09	.85	.00	-.25	.08
15. I criticize myself for having irrational or inappropriate emotions	.16	.78	-.07	-.24	.22
39. I disapprove of myself when I have irrational ideas	.12	.77	-.12	-.24	.17
7. I believe some of my thoughts are abnormal or bad and I shouldn't be thinking that way	.22	.72	.04	-.30	.17
23. Usually when I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about	.03	.71	-.06	-.13	.12
22. I make judgments about whether my thoughts are good or bad	-.11	.69	-.12	-.12	.08
OBSERVING (Alpha .691) & (Average item-total inter correlation .38)					
33. I pay attention to sensations, such as the wind in my hair or sun on my face	.01	.00	.67	-.08	.04
4. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow	.17	-.01	.65	.01	.03
3. When I take a shower or a bath, I stay alert to the sensations of water on my body	-.05	-.07	.57	.07	.05
2. When I'm walking, I deliberately notice the sensations of my body moving	-.03	-.02	.54	.01	-.08
25. I pay attention to how my emotions affect my thoughts and behavior	.39	-.20	.45	.04	.07
11. I notice the smells and aromas of things	.26	.02	.45	-.06	.01
18. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing	-.10	-.12	.44	.09	.04
10. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions	.12	-.15	.44	-.02	.07
AWARENESS (Alpha .799) & (Average item-total inter correlation .45)					
27. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted	.14	.33	-.15	-.74	.07
20. When I do things, my mind wanders off and I'm easily distracted	.09	.16	-.25	-.71	.07
13. I am easily distracted	.20	.09	-.19	-.70	.03
35. I find myself doing things without paying attention	.22	.17	.21	-.70	-.20
26. I find it difficult to stay focused on what's happening in the present	.12	.28	-.12	-.65	.20
34. It seems I am "running on automatic" without much awareness of what I'm doing	.23	.22	.29	-.62	-.13
19. I rush through activities without being really attentive to them	.06	.19	.28	-.57	-.13
12. I do jobs or tasks automatically, without being aware of what I'm doing	.03	.16	.32	-.42	-.23
NONREACTIVITY (Alpha .704) & (Average item-total inter correlation .42)					
24. Usually when I have distressing thoughts or images, I am able just to notice them without reacting	-.11	.13	-.02	-.01	.73
8. I watch my feelings without getting lost in them	-.11	.20	-.07	.04	.65
17. Usually when I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it	.10	.11	.25	-.11	.64
1. I perceive my feelings and emotions without having to react to them	-.14	.11	-.18	.03	.64
32. Usually when I have distressing thoughts or images, I feel calm soon after	-.01	.12	.03	.10	.56
9. Usually when I have distressing thoughts or images, I just notice them and let them go	-.02	.16	.06	-.09	.49
16. In difficult situations, I can pause without immediately reacting	-.09	-.19	.33	.10	.38

NOTE: Bear et al. (2006). The Norwegian translation can be found in Index, under table 4.

TABLE 2: Correlation matrix of the “Five Facet Mindfulness Questionnaire” (FFMQ)

	Non-Reaction	Observing	Describing	Non-Judgment	Awareness
Non-Reaction					
Observing	.07				
Describing	-.05	.13*			
Non-Judgment	.20**	-.12*	.12*		
Awareness	-.00	.03	.24**	.32**	

N = 342 – 343. ** = $p < .01$; * = $p < .05$ (2 – tailed).

Dimensions in the FFMQ were correlated, but not all dimensions were inter-correlated. Too strong correlations may indicate that separate dimensions actually are better conceptualized as one dimension. Too weak or uncorrelated dimensions may indicate that the dimensions belong to different underlying constructs. The negative correlation between observing and non-judgment is consistent with previous findings in a non-meditative sample (Bear et al., 2006). Bear et al. (2006) suggested that four dimensions were characteristic with mindfulness in populations without mindfulness meditation experience. The results reported here (Table 2) were somewhat weaker than previously reported inter-correlations (Bear et al., 2006). Non-reaction and observing correlated only positively with non-judgmental and describing, respectively. While the descriptive facet and the non-judge facet correlates significantly positively with each other and with the awareness facet. Awareness correlates only significantly positively with description and non-judgment facet (Table 2). These patterns of results may indicate that particularly non-reaction and the observing facet fits poorly with mindfulness as a five facets construct in this sample.

TABLE 3: Distribution matrix for the “Five Facet Mindfulness Questionnaire” (FFMQ)

	Low	Medium	High	Mean	S D
Observing	1,7	50,1	48,1	3,64	,58
Describing	10,5	39,7	49,9	3,54	,88
Awareness	8,2	70,2	21,6	3,19	,65
Non-Judgment	22,2	44,6	33,2	3,16	,98
Non-reaction	17,5	71,1	11,4	2,94	,60

Note: The “Low”, “Medium”, and “High” category represents the five point scale divided into three equal parts, with the percent distribution scores.

Table 3 depicts the distribution of mindfulness scores on a 3 point scale. The 3 point scale is the five point scale divided equally in three parts low, medium and high. Mean and SD scores were calculated from the original 5 point scale. The results showed that the observant and the describing indices were negatively skewed (i.e., a longer left tail in the distribution).

3.2 The strategy section and the affective scale of the (MSLQ)

The strategy section of the MSLQ consisted of 50 items plus 4 items measuring test anxiety. Rule of thumb says that sampling size should be at least 10 for each item in a questionnaire. Dimensional structure for the strategy section and the affective scale from the MSLQ were not tested, due to insufficient sample size. Dimensional structure may be insensitive since the MSLQ was originally measured using a 7 point type of Likert scale, and was here measured using a five point type of Likert scale. The original items belonging to its respective index were used to calculate indices and reliability in this study. Correlation structure between the indices was performed (Table 4).

TABLE 4: Correlation matrix for Learning Strategies and Text anxiety of the MSLQ

	TEST ANXIETY	COGNITIVE STRATEGIES				METCOG	RESOURCE MANAGEMENT		
	Test Anxiety	Rehearsal	Organization	Elaboration	Critical Thinking	Meta Cog. Self Reg.	TimeStud Envi	Effort Regulation	Peer Learning
Test Anxiety									
Rehearsal	.19**								
Organization	.05	.49**							
Elaboration	.00	.27**	.53**						
Critical Thinking	-.07	.08	.19**	.58**					
Meta Cog. Self-Reg.	-.12*	.30**	.51**	.57**	.46**				
Time Study Envir.	-.02	.24**	.30**	.25**	.03	.34**			
Effort Regulation	-.07	.22**	.19**	.20**	.05	.38**	.64**		
Peer Learning	-.08	.26**	.31**	.21**	.07	.22**	.27**	.27**	
Help Seeking	-.14*	.18**	.28**	.22**	.00	.25**	.32**	.28**	.67**

N = 338 - 340. ** = p < .01; * = p < .05 (2-tailed).

The learning strategies correlated positively with each other, but were negatively or non-correlated with test anxiety. Test anxiety showed a weak negative or neutral non-significant correlation with every learning-strategy. Rehearsal correlated modestly positively with test anxiety. Critical thinking was not significantly related to the sub-scale resource management, and also not significant to rehearsal. Research carried out previously showed that the cognitive strategies and resource management scales were positively inter-correlated and negatively with test anxiety (Pintrich et al., 1993). These previously reported results were consistent with results in this current study (Table 4).

TABLE 5: Reliability for Learning Strategies and Test Anxiety for the MSLQ

FACTORS	PRIOR REPORTED ALPHAS	CHRONBACH ALPHA	AVERAGE ITEM TOTAL INTER CORRELATION
Rehearsal	.69	.646	.57
Organization	.64	.675	.46
Elaboration	.76	.675	.57
Critical Thinking	.80	.756	.62
MetaCog Self-Regulation	.79	.646	.39
Time&Study Environment	.76	.768	.49
Effort Regulation	.69	.798	.44
Pear Learning	.76	.756	.63
Help Seeking	.52	.786	.50
Test Anxiety	.80	.768	.57

NOTE: "Prior reported Alphas" were found in Pintrich, (1993)

Table 5 is an overview of previous reported Chronbach alphas and Chronbach alphas in this study. The majority of the indices have Chronbach alphas above .70, showing good reliability, with some exceptions. Organizational strategies, effort regulation and rehearsal have an alpha of .675, .646, and .629 respectively (Table 5). Overall, the results in study replicated previously reported Chronbach alphas (Pintrich et al., 1993). Chronbach alphas of the learning strategies (Table 5), and correlations between the indices of the learning strategy scale (Table 4), and the affective scale of the MSLQ were consistent with previous results (Pintrich et al., 1993). The learning strategies correlated positively with each other, but were non-correlated with test anxiety, with two exceptions. Meta-cognitive self-regulation and help seeking were significantly negatively correlated with test anxiety, and rehearsal was positively correlated with test anxiety.

3.3 Goal accomplishment and goal dissatisfaction

Goals setting was firstly tested as a single dimension, but showed unsatisfactory Chronbach alphas and average item total inter correlations. Exploratory analysis with oblimin rotation suggested a three factor solution, however, item 8(7) (see index, Questionnaire), (*I get regular feedback in relation to my goals*) did not fit this factor solution. Exploratory factor analysis after item 7 was omitted revealed a two factor solution using Eigenvalue 1. Dimensions fell into two dimensions, one characterized by having clear goals, an understanding of how work was measured, and a satisfaction with the ability to reach the goals. These items were broadly termed "Goal Accomplishment". The second dimension was generally characterized as having too many goals, not being able to reach them and a general feeling of stress in pursuit of goals. These items were broadly termed "Goal Dissatisfaction (Table 6). Correlation

analysis revealed that item 10 correlated with both dimension, but strongest with the goal dissatisfaction dimension (Table 2, appendix). It is suggested that not reaching ones goals may be followed by a tendency to feel frustrated and generally dissatisfied when trying for goals, thus eliciting avoidance behavior.

TABLE 6: Dimensional structure for Goal-Setting

Goal-setting v(8) 1, 2, 3, 4, 5, 6, 13, 12, 11, 10, 9, 8	1	2
GOAL - ACCOMPLISHMENT		
Alpha .824		
Average inter-item correlation .57		
v8_2. I have specific, clear goals to aim for in my studies	.84	.07
v8_1. I understand exactly what I am supposed to do in my study	.74	.14
v8_3. The goals I have in my study are challenging, but reasonable	.71	.19
v8_4. I understand how my performance is measured in my study	.68	.10
v8_13. I have long term goals for my studies (f. example. To get into a specific	.67	-.07
V8_6. Trying for goals makes my study more fun than it would be without goals	.64	.14
v8_5. If I have more than one goal to accomplish, I know which ones are most important and which are least important	.59	-.02
GOAL – DISSATISFACTION		
Alpha. 740.		
Average Inter-item correlation .51		
r8_11. I have too many goals in this study	.00	.81
r8_9. My goals are much too difficult	.11	.81
r8_10. I often fail to attain my goals	.31	.70
r8_8. I find working towards my goals to be very stressful	-.12	.67
r8_12. Some of my goals conflict with my personal values	.11	.43

Note: Original items are written to fit a work context, items were therefore adapted to fit a learning context.

Locke and Latham (1990 s. 355) pointed out that their questionnaire may relate more strongly to a satisfaction scale than to performance because of no suitable goal difficulty items in the scale, goal – accomplishment were used.

NOTE: See Table 5 in Index for Norwegian translation.

The results revealed satisfactory Chronbach alpha and inter-item correlation (Table 6). Correlation between the dimensions showed a weak to modest significant negative coefficient between the dimensions, $-.20^{**}$ with significance at $^{**} = p < .01$.

Table 7 depicts percent distribution scores on a 3 point scale and mean and standard deviation of the learning strategy and goal-setting scale. Mean and SD were calculated from the five point scale. The distribution scores on self-regulated learning were calculated by dividing the five point scale into three equal parts and measuring the percent fallout in this altered scale. The Goal accomplishment scale was negatively skewed and the goal dissatisfaction scale was positively skewed. The learning strategies “Organization” and “time study environment” were

negatively skewed, while “Test-Anxiety” was normally distributed (Table 5) (i.e., skewedness is a measure of the asymmetry of the probability distribution negative skew indicates that the tail on the left side of the probability density function is longer than the right side, and a positive skew a longer right tail).

TABLE 7: Distribution matrix for Learning Strategies and Goal-Setting

	Low	Medium	High	Mean	Std. Deviation
Test Anxiety	29,2	41,9	28,9	2,99	1,02
Rehearsal	25,9	55,9	18,2	2,88	,81
Organization	14,4	47,1	38,5	3,34	,83
Elaboration	5,9	40,8	53,3	3,69	,73
Critical Thinking	15,3	55,3	29,4	3,19	,85
Meta Cog. Self-Regulation	8,2	73,5	18,2	3,19	,56
Time Study Environment	4,7	49,7	45,6	3,53	,68
Effort Regulation	11,8	54,4	33,8	3,30	,76
Peer Learning	41,2	35,3	23,5	2,72	1,00
Help Seeking	34,4	46,2	19,4	2,79	,90
Goal Accomplishment	6,3	40,5	53,3	3,63	,77
Goal Dissatisfaction	58,3	38,4	3,3	2,23	,73

Note: The “Low”, “Medium”, and “High” category represents the five point scale divided into three equal parts, with the percent distribution scores. Mean and SD is calculated from the five point scale

4. DISCUSSION

Previous results have shown that observing may not be part of an overall mindfulness construct in populations without meditation experience (Bear et al., 2006). Previous inter-correlations of the FFMQ have found a negative association between observing and non-judgment (Bear et al., 2006). This negative association between observing and non-judgment was replicated in this study. Therefore, observing may also not fit with an overall mindfulness construct in this study. In addition to this, non-reaction was also non-related to three of the other mindfulness dimensions. It seems therefore that only awareness, non-judgment and describing dimensions fits with an overall mindfulness construct.

The five facets of mindfulness may be positively associated in populations with mindfulness meditation training, but not without. For example observing of thoughts and feelings, as it primarily concern covert actions, may correlate with introversion, while describing of

thoughts and feelings, as it is an overt action, may correlate with extraversion. In this way, third variables may impact students' choice of strategy.

Non-judgment taps into general level judgments (i.e., whether thoughts and feelings are good or bad) of thoughts and feelings. The observing, describing and non-judgment dimensions are similar in focusing on bottom-up processing and focusing on closer contact with present experiences. However, the negative association between observing and non-judgment indicates that this does not measure the same underlying construct. In these results, non-reaction and observing were either differently correlated within the sample, and/or the facets are differently related to other constructs, such as extraversion and introversion.

Inter-correlations between the FFMQ dimensions supports the notion that students without mindfulness meditation tend not to differentiate between their observation of inner states, such as feelings and thoughts and their judgment of them. These results were consistent with a positive correlation between observing and test anxiety in this study as well as positively association between the observant facet and several mal-adaptive constructs like dissociation, absentmindedness, and thought suppression (Bear et al., 2008). Non-judgment, non-reaction and awareness dimensions were negatively associated with test anxiety. It is however unclear whether the tendency to observe inner experience is enough to produce anxiety or whether it interacts with other dimensions of mindfulness to result in anxiety. However, the pattern of correlations supports the notion that judgmental attitudes brought to self-focused attention are anxiety promoting.

Bishop et al. (2004) identified two working mechanisms of mindfulness, a present moment focus towards immediately experience and affective-cognitive qualities of curiosity, acceptance and openness brought with attention. The observing facet and the describing facet involve attention towards internal experiences, and may therefore be compared with self-focused attention. The non-judgment and non-reaction facet aims at inner experiences; thoughts and emotions, but describes more a quality of attention than where attention is directed. Farb et al. (2007) suggested that there were two self-reference systems that may be habitually integrated in individuals without meditation experience, but could be differentiated with meditation training. However, meditation experience was unfortunately not explicitly measured in this study.

Test-anxiety measures anxiety in the context of test taking, but Carver et al. (1983) suggested that test anxiety may be better conceptualized as fear of being evaluated by others. Help seeking may consist of asking authority figure for help, and therefore making oneself vulnerable to the judgment of others. The negative correlation between test anxiety and help seeking makes sense in this context.

Awareness and describing were consistently positively correlated with resource management strategies, cognitive strategies and meta-cognitive strategies. Observing was primarily correlated with cognitive strategies. One reason for this may be that observing correlates more with covert coping strategies that does not require social confrontations, such as help seeking and peer-learning. This pattern is consistent with the view that observing may be associated with introversion. However, this line of argumentation is also in line with research by Carver et al. (1983) who hypothesized that anxious individuals in a self-focused attention eliciting setting tend to withdraw mentally, when physical avoidance were unavailable to them. Therefore, the tendency to self-observe and to use covert regulation strategies may be caused by both the tendency for introversion as well as anxiety.

This may be particularly evident in comparisons with experiences that elicit anxieties, and consequently avoidance behavior (Bishop et al., 2004), as approaching inner experience with an attitude of openness, curiosity and acceptance should eventually make strategies to avoid unpleasant states redundant (Bishop et al., 2004).

Rehearsal correlates modestly positively with test anxiety. It may be that rehearsal is the preferred strategy of choice for naive learners. Rehearsal consists of repeating lecture material and of using rote remembering techniques to study. Students that use this strategy may not have accumulated knowledge structure to take advantage of more complex strategies. It may be that students that have not studied for a long time relies on rehearsal to a greater degree. Also, students that use rehearsal may do less well on tests, and as a consequence expect future results to reflect prior performance, and thus be more anxious.

Correlations between mindfulness and goal setting reveal a significant positive correlation across all indices of mindfulness with goal accomplishment and a significant negative correlation across all indices of mindfulness with goal dissatisfaction. It may be that mindful students are better at following through with their intention. Previous studies support that

mindfulness moderates positively the relationship between intention and behavior (Chatzisarantis & Hagger, 2007).

Students that are less judgmental about their thoughts and feelings may use less avoidance strategies in their goal seeking behavior. One of the reasons may be because they experience their thoughts and feelings as less threatening. Bishop et al. (2004) points out that it is not content of thoughts and feelings that changes with mindfulness meditation experience, but the relationship with thoughts and feelings (i.e., content of consciousness). The relationship to thoughts is reduced to having the same status as other sense experiences, such as sounds or mental pictures. They are simply temporary mental events, without any particular strong claim to reality.

Mindfulness in attention to minute present moment focus, may be able to detect changes in contexts that make one strategy more productive than another. Mindfulness and learning strategies may therefore be associated. In addition, mindfulness increases awareness of inner state and therefore influences the ability to regulate effort and to selectively act on thoughts and/or feelings.

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PAPER 2:

**A CLUSTER ANALYTICAL APPROACH TO
MINDFULNESS AND SELF-REGULATED LEARNING**

Master's Thesis in Social and Community Psychology

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ABSTRACT

Mindfulness is a kind of present moment focused attention in combination with attitudes of non-reaction and non-judgment, which is used in the treatment of stress and anxiety disorders. Studies conducted comparing pre and post mindfulness meditation experience has reported self-regulatory effects following mindfulness training. The question addressed in this paper is whether more mindful individuals were more self-regulative in their approach to learning. This was tested using self-report questionnaire based on the “Five Facet Mindfulness Questionnaire” (FFMQ) [(Baer, R. A., Smith, G. G., Hopkins, J., Krietemeyer, J. & Toney, L. (2006). Using Self-Report Assessment Methods to Explore Facets of Mindfulness. *Assessment*, 13(1), 27-45.)], against the “Motivated Strategies for Learning Questionnaire” (MSLQ) [(Pintrich, P. R., Smith, D. A. F., Garcia, T., & Mckeachie, W. J. (1991). A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ). Non-Journal item.)], and a goal-setting questionnaire. Response tendencies were extracted using cluster analysis and compared with self-regulative learning components using MANOVA analysis, gender, age and education were set as covariates. The sample consists of 346 students from the Norwegian University of Science and Technology (NTNU), with a response rate of 41%. Three clusters were extracted, their characteristics described and compared with self-regulated learning components. The results showed a significant difference between the clusters on self-regulative learning, even when age, education and gender were controlled for. Members of cluster 1 and 3 scored lower on mindfulness facets and also scores lower on self-regulative learning indices compared with members of cluster 2. Members of clusters 3 were self-focused, but judgmental towards inner thoughts and feelings. This cluster had the highest test anxiety scores. Members of cluster 2 scored high on self-focused attention, but were non-judgmental towards their inner experiences. Members of cluster 2 scored very low on test anxiety. This was consistent with previous research point to patterns of adaptive and maladaptive self-focused attention. Members of cluster 2 scored consistently higher on every learning strategy facet, lower on text anxiety, were more goal accomplished and less dissatisfied by their goals than the two other clusters. The main difference between cluster 1 and 3 were that members of cluster 3 had a much higher test anxiety score. Results are discussed in relation to cluster profiles.

1. INTRODUCTION

Mindfulness originates from eastern spiritual practice and is frequently associated with meditation, specifically mindfulness meditation or Vipassana meditation; a method used to facilitate closer contact with ongoing experiences, or insight into one's own mind. Bishop et al. (2004) identified two key components of mindfulness or mechanisms of mindfulness. "*The firstly component involves the self-regulation of attention so that it is maintained on immediate experience, thereby allowing for increased recognition of mental events in the present moment. The second component involves adopting a particular orientation towards one's experiences in the present moment, an orientation that is characterized by curiosity, openness, and acceptance*" (Bishop et al., 2004). An interaction between these two components is suggested, such that attitudes associated with mindfulness increases access to present experiences (Kabat-Zinn, 2006; Bishop et al., 2004).

Carver et al. (1983) found that self-focused attention interacted with test anxiety, improving performance on low anxious individuals, but impairing performance among test anxious subjects. Carver et al. (1983) argued that test anxious subjects would feel an impulse to withdraw in the face of obstacles they did not believe they could overcome. Mindfulness is used in the treatment of anxiety disorders and is associated with a tendency to hold an attitude of non-judgment towards ongoing experience. Affective qualities characterized by the mindfulness state may therefore facilitate present focus by reducing the need to escape or avoid experience. Thus, mindfulness may be conducive to the engagement with present experiences.

Studies investigating the association between mindfulness and engagement in a learning context have been less frequently carried out, but studies also support the notion that mindfulness may increase engagement with learning (e.g., Kee Kwa & Wang, 2007; Garden & Moore, 2004). Kee Kwa and Wang (2008) investigated the connection between mindfulness, flow and mental skill adoption and found that athletes that scored higher on mindfulness use more mental skills, such as attention control, emotional control, goal setting, imagery and self-talk strategies. Garden and Moore (2004) outlines several case studies that points to the effectiveness of a Mindfulness Acceptance Commitment (MAC) based approach to athletic performance.

The purpose of this paper was to investigate the relationship between mindfulness and self-regulated learning. Self-regulative learning is by Zimmerman (2000) defined as “*self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals*”. Zimmerman (2000) imagined self-regulative learning to consist of three phases, a forethought phase, a performance phase and a self-reflection phase in this order, thus it is cyclically adapted. In comparing mindfulness and self-regulative learning it may however be more interesting to look at the association between mindfulness and its’ regulative ability on thought, feelings and action.

1.1 Mindfulness and attention regulation

In mindfulness meditation one is encouraged to notice content of consciousness, but not to elaborate on these or engage these thoughts or feelings. Attention in mindfulness meditation is used to monitor awareness, and to bring attention back to the present, often by using the breath as a point of focus. In this way, attention in mindfulness is not used to interpret or analyze reality in a certain way. Previous research has found that attending to moment to moment changes in heart rate improved the regulation of heart rate (Delizonna et al., 2009). Effects following Mindfulness-based Stress Reduction (MBSR) course and mindfulness retreat have also found improvements attention control (Jah et al., 2007). Studies conducted with control group have found improvement in cognitive flexibility, reduction in over-general autobiographical memories, increased autobiographical memory specificity and inhibition of pre-potent responses following MBCT (Watkins & Teasdale, 2004; Heeren et al., 2009).

1.2 Mindfulness and affect regulation

Being self-critical and judgmental are usually maladaptive self-regulatory strategies (Low et al., 2008; Watkins & Teasdale, 2004). Garden & Moore (2004) outlines several case studies that points to the effectiveness of a “Mindfulness Acceptance Commitment” (MAC) based approach to athletic performance. Iskender (2009) found a significant positive correlation between mindfulness, control belief for learning and self-efficacy as well as a strong association between self-kindness and mindfulness. Iskender (2009) suggested that self-compassionate individuals tend not to judge themselves too harshly when they notice something about themselves they do not like, and that this may cause them to persist in spite of setbacks or negative feedback. Ortner et al. (2007) argued that mindfulness practitioners

were able to disengage attention more rapidly from emotional provocative stimuli. Carver and Scheier (2000) compared self-regulation to a cruise control, aiming at holding the object of regulation at a specific level. Quicker return after exposure to upsetting emotional pictures indicates in this context that mindfulness enhances affect regulation. One possible effect of this may be the reduction in the need to avoid uncomfortable states.

1.3 Mindfulness and behavior regulation

Chatzisarantis and Hagger (2007) found that mindfulness moderated the intention-behavior relationship by predicting physical activity only among mindful individuals. This study showed that individuals that were more mindful were more likely to carry out their intention. It was argued that a heightened awareness of environmental cues, as well as increased awareness of present moment thoughts and feelings, helps individuals to follow through with their intention.

Bishop et al. (2004) argued that the ability to discriminate between thoughts and elements of experiences, and to observe how one experience gives rise to another, may lead to the generation of differentiated and integrated representations of cognitive and affective experience. Brown and Ryan (2003) suggested that mindfulness functions as an integrative agent by enhancing capacities to act congruently with one's intentions, values and goals. Kabat-zinn (1990) argued that becoming aware of thoughts and impulses as they happen and approaching these with non-judgment and non-reaction may create room to let go of ingrained patterns of behavior. Mindfulness may be a way of opening up for more choices by detaching from automatic behavioral patterns, thus creating opportunities for tuning and modifying behavior. For example in choosing to react to counter intentional impulses, such as surfing the net or playing games when one intends to study. Consequently, students that are more mindful may in the long run create better study habits than less mindfulness students.

1.4 Self-regulative learning and mindfulness

In the context of learning, self-regulation is the tendency to be goal-oriented and to set in motion thought, affect and behavior in reaching those goals (Zimmerman, 2000). Therefore, effective self-regulation in learning contexts usually involves setting goals, or sub goals and the initiation of different strategies to move the present state of affairs closer to the goal state. This may imply regulation of affect that support persistence and engagement with task, and/or

using different strategies to generate feedback (Zimmerman, 2000). Mindfulness on the other hand is not about moving present state of affairs closer to some ideal state or goal, but about being where one is, without judging, analyzing, or comparing ongoing experience to some standard. Attention in the mindfulness state is used to take in information from present state, but without evaluating and/or judging this state. Attention in the goal oriented mode is used to monitor the present state and discrepancy with wished state. The attention resources available in the mindfulness state and the achievement state are used differently. Studies conducted have found the mindfulness state to be affect-regulating (Ortner et al., 2007). One possible consequence of this in terms of self-regulated learning concerns covert regulation of state and affect that support learning behavior.

Evans et al. (2009) investigated the effects of mindfulness on persistence, measured as behavioral self-regulation. This study investigated whether mindfulness would predict persistence on a difficult lab task. The participants were supposed to solve 10 anagrams of various difficulties, with a total time limit of 90 sec per anagram. The first anagram had no solution and the participants were asked to move on if they had not done so within 5 min. Evans et al. (2009) found non-reaction and non-judgment to be significantly related to persistence on the anagram tasks. These affective qualities of mindfulness may influence feedback, how information is processed, and consequently impact students' self-regulation. Ongoing observation of one's experiences paired with non-judgment and acceptance may increase the ability to stay with present experiences even when they feel uncomfortable.

Bear et al. (2006) suggested that individuals without meditation experience may not typically separate between their observation of inner experience and their judgment of them. Individuals that are mindful may therefore be characterized by the pairing of both the tendencies, a present focus on inner experience and attitudes of non-judgment and/or non-react towards inner experience. Previous research has found that the non-judgment and the non-reaction facet of mindfulness may improve persistence (Evans et al., 2009). Previous studies have also found that self-focused attention and self-directed attention may be both adaptive as well as maladaptive to performance (Carver et al., 1983).

Iskender (2009) suggests that individuals that are self-compassionate tend to judge themselves less harshly when they notice something about themselves they do not like, and that they therefore may allow them to persist in spite of setbacks or negative feedback. Being self-

critical and judgmental about one self are usually maladaptive self-regulatory strategies (Low et al., 2008; Watkins & Teasdale, 2004). Similarly, self-evaluative reactions to behavioral outcomes impacts goal outcome (Zimmerman & Kitsantas, 1997).

The experience of not reaching a high valued goal may increase rumination; a way of responding to distress that involves repetitively (and passively) focusing on the symptoms of distress, and on its possible causes and consequences. In mindfulness the client is taught that to relate to thoughts and feelings in a wider or decentered perspective, where content of consciousness are more thought of as passing mental events, without holding any particular claim to reality. In such a perspective what might have normally elicited anxiety, may in this decentered perspective be processed more fully. Such as de-centered perspective may result in the generation of more feedback and more accurate feedback (Shapiro & Schwartz, 2000).

In short, taking in information with attitudes of acceptance, openness and detachment may allow for a closer contact with ongoing experiences. In these instances it seems that mindfulness may only be adaptive when information is threatening to the self. However, Radel et al. (2009) found that students that were more mindful, were more immune to both negative and positive priming conditions. Indicating that the students that are more mindful may process more meta-cognitively or maybe they aim more for the informational value in the feedback, rather than the opportunity for self-esteem enhancement or protection.

The propensity to be mindful is a normal tendency within the population, it was expected that mindfulness tendencies would be present also in a non-meditative experienced student population (Brown & Ryan, 2003). Research conducted previously has however found mindfulness to be differently internally associated depending upon mindfulness meditation training (Bear et al., 2006). An investigation into response tendencies may therefore be informative when comparing mindfulness and self-regulation. The relationship between mindfulness and self-regulation was tested with a self-report questionnaire, using the Five Facet Mindfulness Questionnaire (FFMQ), part of the Motivational Strategies for Learning Questionnaire (MSLQ), and a sample of questions from a Latham and Locke goal-setting questionnaire.

1.5 Aim this paper

The aim of this paper was to investigate the association between mindfulness and self-regulation, measured as students' cognitive strategies, meta-cognitive self-regulation strategies, resource management strategies, goal accomplishment, goal dissatisfaction and test anxiety. However, because the facets that make up mindfulness in the FFMQ may be differently related to each other, depending upon how students relate to their own thoughts and emotions, the first task entailed differentiating these respondents. It was expected that students above average score on mindfulness facets would be more self-regulative in their learning.

1.6 Predictions

1.6.1 Test anxiety

Mindfulness is frequently used for treatment of anxiety and stress, indicating that mindfulness may be incompatible with these states. It was therefore predicted that students that scores highly on mindfulness will experiences less stress and anxiety during high stress situations such as exams and other situations that may trigger self-focused attention. Mindfulness has also been positively correlated with age and education. Students that have studied for a longer time, as well as older students may therefore experience less stress or to tackle high stress situations such as exam situations better.

1.6.2 Cognitive strategies

Previous studies conducted in a sport setting showed a more frequent use of mental skills to keep attention on track, with participants that were more mindful (Kwa Kee & Wang, 2008). Studies conducted have also found that mindfulness may improve executive function, such as holding attention and shifting attention (Jah et al., 2007). Pintrich et al. (1990) claimed that self-regulation require the flexible use of different strategies to fit the challenge. It is therefore predicted that students that were more mindful, would use more strategies to keep attention on track and to flexibly change between different strategies. Learning strategies may also be influenced by education and age.

1.6.3 Meta-cognitive self-regulation strategies

Meta-cognitive self-regulative strategies' enables students control and regulate their own cognition (Pintrich et al., 1993). These strategies acts on more basic strategies and are

informative in their utility, in other words meta-cognitive strategies consists of monitoring our understanding and that lets us know whether we have used a strategy that works or if revision is needed. As mindfulness is described as a state that leads to greater awareness of present moment experience, it was predicted that mindfulness and meta-cognitive self-regulation strategies would be positively associated.

1.6.4 Resource management strategies

Resource management strategies consists of the use of effort regulation, the efficient usage of time and place, the use of friends and help seeking to further one's study goals. Carver et al. (1983) claimed that test anxiety may be more accurately conceptualized as fear of evaluation by others, rather than fear of bad performance in and of itself. Social situations such as implied by peer learning and help seeking, may make students that are afraid of others' evaluation to shy away or to choose these social forms of learning less frequently. Mindfulness as it is measured here consists of at least two aspects, self-focused attention and attitudes towards inner experience (Bishop et al., 2004). Self-focused attention has been found to be both adaptive and maladaptive engagement with task, depending upon anxiety (Carver et al., 1983; Watkins & Teasdale, 2004). Mindfulness is used in the treatment of anxiety. Consequently, mindfulness is expected to be associated with adaptive self-focused attention. Effort regulation refers to persistence in spite of contrary impulses (e.g., persisting in spite of boring or un-interest in lecture or material). Mindfulness is expected to be positively associated with this scale. For example Chatzisarantis and Hagger (2007) found that mindfulness mediates between intention and behavior. Time study environment refers to the usage of time and place appropriately, that support studying (Pintrich et al., 1993). It is suggested that mindfulness leads to an integration of cognitive and affective experience (Bishop et al., 2004), therefore, a greater awareness of contextual influences are suggested to result.

1.6.5 Goal setting

Previously goal setting was defined as a central element in self-regulated learning (Zimmerman, 2000). In goal setting attention is used to monitor discrepancies between current states and ideal states, or goal states (Carver & Scheier, 2000). Roeser and Peck (2009) have pointed out that mindfulness may strengthen executive control mechanisms. The non-evaluative way of taking in information which characterizes the mindfulness state may be

particularly adaptive to counteract defensive behaviors like avoidance and distracting. Potential threatening information in mindfulness is separated from its self-relevant meanings, and therefore may change the implications that negative feedback usually implies in more ego-involved students. Goals may therefore be more persistently pursued in spite of setback or negative feedback. Consequently, it is expected that students that were more mindfulness would be more goal accomplished.

2. METHODS

2.1 Sample

The sample consisted of 346 students from the Norwegian University of Science and Technology. Response rate was 41%. 247 (71,4 %) were female and 93 (26,9 %) were male, 1,7 % did not specify gender. 124 (35,8 %) were below 21, 151 (43,6 %) were between 21 – 24, 48 (13,9 %) were between 25 – 29, and 21 (6,1 %) were 30 years or older, 2 (.6 % missing). 253 students have studied between 1-6 semesters, 59 have studied between 7-10 semesters and 30 students have studied 11 semesters or more.

2.2 Instrument

A self-report questionnaire was used and consisted of a demographical section, a mindfulness questionnaire, a learning strategy questionnaire, a goal setting questionnaire and test anxiety. The demographical section measured gender, age, education (how many semesters studied in the university), average hours studied weekly and faculty attachment (technical or humanistic). These two last demographical questions were however dropped in the final analysis as it was judged to be irrelevant to the purpose of the study. The mindfulness questionnaire consisted of the “Five Facet Mindfulness Questionnaire” (FFMQ), the learning strategy scale consisted of the strategy section and the affective scales from the “Motivational Strategies for Learning Questionnaire” (MSLQ) and the goal setting questionnaire consisted of a sample of items developed by Latham and Locke (1990). The mindfulness and the self-regulation scale is in this investigation measured using a 5-point type of Likert scale from never or very rarely true to very often or always true (slett ikke sant = 1 til svært sant = 5). Age is measured on a four point scale, below 21 years old, between 21 and 24 years old,

between 25 and 29 years old and 30 and above. Education was measured by number of semesters studied and gender was nominally measured.

The FFMQ consists of five facets, describing, observing, awareness, non-reaction and non-judgment. Describing and observing taps into self-focused tendencies while non-reaction and non-judgment taps into a tendency to bring these affective-cognitive qualities with the self-focused attention. The awareness facet taps into a tendency to stay with experience, such as not daydreaming and not escaping current ongoing experiences.

2.3 Data analysis

Cluster analysis is method for finding groups by clustering individuals that score similarly on some variable(s). Based on previous correlation studies dimensions of mindfulness are differently related depending upon meditation experience. However, mindfulness is considered a normal trait or tendency that individuals can be, to one degree or another. To determine these patterns these five facets were used to determining the cluster solution.

For convenience reasons SPSS was used to perform the cluster analysis. In order to figure out optimal number of clusters a hierarchical cluster analysis was carried out. No formal rules are put forth to determine the number of clusters for extraction; however, some heuristics' have been suggested (Everitt et al., 2001). One way is to study the coefficients values and compare this with the agglomeration schedule. The distance between the coefficients indicates the distance between each cluster or the between-cluster heterogeneity. A marked flattening of the coefficients indicates that optimal between cluster heterogeneity has been reached (Everitt et al., 2001). On the basis of the hierarchical cluster analysis and interpretability a K-means cluster analysis was carried out.

Hierarchical clustering is useful to determine the number of clusters in the data, but is unsuited to produce optimal cluster solution, that is, the optimal between cluster heterogeneity. Hierarchical classification cluster individuals by fusing individuals into groups or by dividing n-individuals into finer groupings, however once fusion or division is made the individuals cannot be decoupled (Everitt et al., 2001). Therefore, based upon the X number of clusters found with hierarchical cluster analysis a K- means analysis were performed. K-

means cluster analysis allocates each case or individual to the cluster that has the nearest centre point.

Chi-square was performed testing if the three clusters differed with regards to gender, age and education. A multivariate analysis of variance (MANOVA) was carried out to investigate the differences in the use of learning strategies, test anxiety and goal setting between the clusters. The K-means cluster solution was set as independent variable and the cognitive strategies, the meta-cognitive self-regulative strategies, the resource management strategies, test anxiety and goal setting scales were set as dependent variables. Gender, age and education were set as covariates.

3. RESULTS

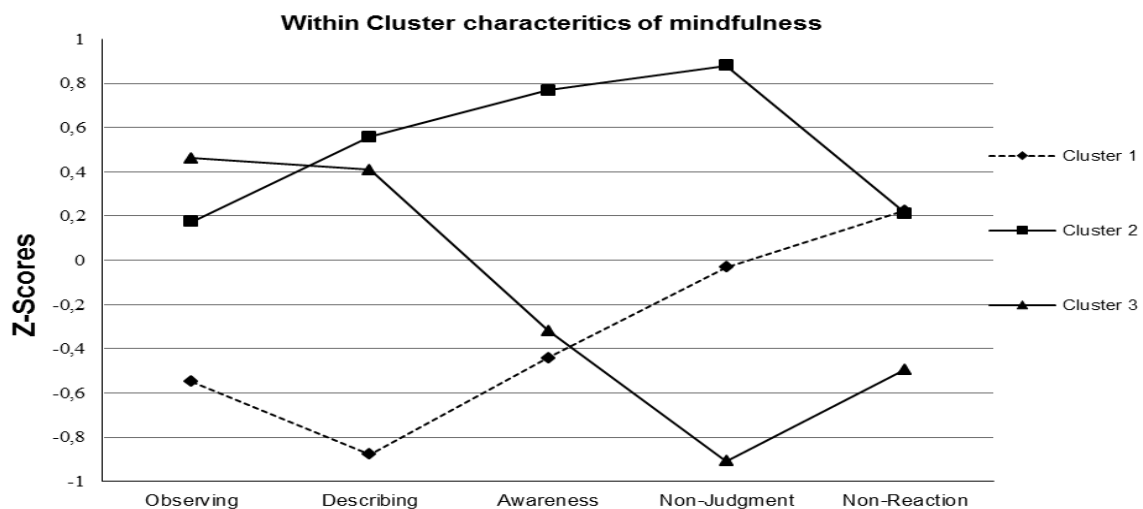


FIGURE 1

According to Bishop et al. (2004) there are two main mechanisms in mindfulness, a present moment focus and attitudes associated with mindfulness. In line with this distinction the observing and describing facet can be categorized as a present moment focus, or a self-focused attention, while the facets non-judge and non-react can be categorized as attitudes towards those self-focused thoughts.

Hierarchical cluster analysis indicated a three cluster solution and K-means cluster analysis found the optimal between cluster heterogeneity. Figure 1 is a visual representation for how the five dimensions within mindfulness, such as it is measured by the FFMQ, were distributed on these three clusters. The left side of the graph, *observation and describing*, taps into students' tendency to focus on their own cognition and emotions, such as attending to internal

and external stimuli, (i.e., how thoughts and cognition influences each other and the tendency to label internal experiences with words). The right side of the graph taps into the affective relationship between cognition and emotion, such as taking a non-evaluative stance towards own thoughts and feelings and feeling calm after being emotionally upset, or not being carried away with thoughts and emotions. The awareness facet concerns the tendency to stay focused on present moment (e.g., not doing things unconsciously or on automatic pilot).

3.1 Cluster characteristics

Members of cluster 1 were characterized by low self-focused attention in combination with higher non-reaction and non-judgment towards own inner experience; thoughts and emotions (Figure 1). Members of this cluster were either not judgmental or reactive towards their thoughts and emotions, or their relatively higher scores on non-judge and non-react may be a consequence of this cluster's below average self-focused attention. In short, they may from the onset be relatively unaware of their thoughts and emotions and therefore also less judgmental or reactive towards their thoughts or feelings.

Members of cluster 2 scored consistently above mean on all the facets of mindfulness (Figure 1). This cluster was characterized by being above average in self-focused attention combined with relatively higher scores on non-reaction and non-judgment. This combination fits closest with how Bishop et al. (2004) characterizes mindfulness. Literature support the associated between mindfulness and self-regulative learning and parallel lines of research support the association between less ego – involved students and more adaptive patterns of learning. It was therefore predicted that cluster two will follow the predictions put forth earlier between mindfulness and self-regulative learning.

Members of cluster 3 were characterized by an above mean score on the observing and the describing facet, and below average scores on non-reaction and non-judgment (Figure 1). This high/low combination indicates that this cluster tend not to separate observing and describing of inner experience, from the judgment of them. Members of cluster 3 were self-focused but in a judgmental way and this may therefore hamper their ability to be in close contact with their thoughts and feelings. Being judgmental of their own thoughts and feeling may make this cluster particularly vulnerable in setting where they run the risk of being evaluated by others.

TABLE 1: Cluster demographics and cluster comparison between education, age and gender using Chi Square

	Mean Semester	Education			Age				Gender: frequency(per cent)	
		1	2	3	-21	21-24	25-29	30+	Male	Female
Cluster 1 (n=122) <i>Expected</i>	4,75	94 <i>90,1</i>	20 <i>21,</i>	8 <i>10,</i>	45 <i>43,9</i>	56 <i>53,5</i>	16 <i>17,1</i>	4 <i>7,5</i>	45(37,2%) <i>33,3(27,5%)</i>	76(62,8%) <i>87,7(72,5%)</i>
Cluster 2 (n=114) <i>Expected</i>	5,75	76 <i>83,4</i>	25 <i>19,</i>	12 <i>10,</i>	33 <i>41</i>	50 <i>50</i>	16 <i>16</i>	13 <i>7</i>	26(23,4%) <i>30,5(27,5%)</i>	85(76,6%) <i>80,5(72,5%)</i>
Cluster 3 (n=106) <i>Expected</i>	4,83	81 <i>77,5</i>	14 <i>18,</i>	10 <i>9,3</i>	43 <i>38,1</i>	44 <i>45,5</i>	15 <i>14,9</i>	4 <i>6,5</i>	22(20,8%) <i>29,2(27,5%)</i>	84(79,2%) <i>76,8(72,2%)</i>
SUM N=346 4 Missing					121 35,8%	150 43,6	47 13,9%	21 6,1%	93	245
Chi square:	$\chi^2=4.695, p>.05$			$\chi^2=10.045, p>.05$				$\chi^2=9.040, p<.05$		

Note: Chi square between clusters on 3 demographic values, education, age and gender

The demographical data reported were mean semester, education, age and sex. Education was measured by the number of semester studied and later converted into more general categorical values, such that “1” under “Education” refers to 1-3 years of study, “2” refers to 4-5 years of study and “3” refers to more than 5 years (Table 1).

In order to test whether the three clusters were equal across demographical data, chi square were performed, comparing the three clusters on education, age and sex. Chi square revealed a significant difference between the three clusters on gender ($\chi^2 =9.040$, $df=2$, $p =.011$), but not between the clusters on age ($\chi^2 =10.045$, $df=6$, $p =.123$) or education ($\chi^2 =4.694$, $df=4$, $p =.320$) (Table 1). Females are in majority in all three clusters, with as much as $\frac{3}{4}$ in cluster 2 and 3, and $\frac{2}{3}^{\text{rd}}$ in cluster 1. It is therefore suggests that the significant difference in gender in the three clusters are between 1 and the other two clusters.

Comparison between the clusters, reveal an about equal n-size, with a difference of 16 subjects separating the smallest from the biggest group ($\chi^2 =1.123$ $df=2$, $p =.570$). Mmembers of cluster 2 have studied one semester longer than the other groups, and were one average slightly older than cluster 1 and 3. Comparison between the demographic data, reveal no significant difference between gender distribution on education in the sample ($\chi^2 =1.063$ $df =2$, $p =.588$), as well as no significant difference between age and sex ($\chi^2 =.834$, $df =3$, $p =.841$).

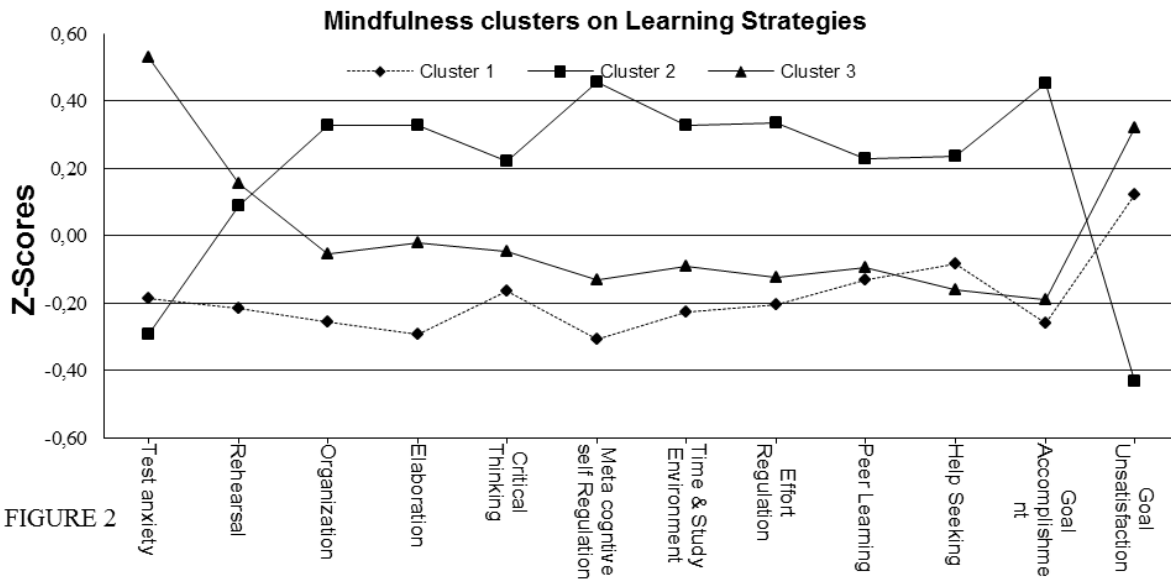


FIGURE 2

3.2 Description of the three clusters on self-regulated learning

A visual representation of the three mindfulness clusters scores on self-regulative learning components is presented in figure 2. The self-regulative learning components can be divided further into three scales, an affective scale, a goal setting scale and a learning strategy scale. The affective scale consists of test anxiety, the goal setting scale consists of goal accomplishment and goal dissatisfaction and the learning strategy section consist of the indices between these two other scales (Figure 2). The learning strategy section consisted of 9 different strategies that can further be divided into three subscales, cognitive strategies, meta-cognitive self-regulative strategies and resource management strategies. The cognitive strategies are ranked from simple strategies like rehearsal, to more complex cognitive strategies like organization, elaboration and critical thinking strategies. The meta-cognitive self-regulative strategies, allows for the greatest flexibility in the use of strategies and taps into planning, goal setting, monitoring and controlling cognition. Resource management strategies tap into the use of personal resources, like the manipulation of time and study environment, effort regulation, peer learning and help seeking.

Multivariate analysis of variance (MANOVA) with learning strategies, test anxiety and goal setting as dependent variables, cluster solution as independent variable and gender, age and education as covariates using Wilk's statistics revealed a significant difference between the clusters $\Lambda = .71$, $F(24,63) = 4.95$, $p < .0005$, and an interaction effect between gender and the dependent variables $\Lambda = .81$, $F(12,31) = 6.80$, $p < .0005$. A closer investigation using

ANOVA revealed a significant difference between the clusters on every dependent measure. Test anxiety, organization, elaboration, meta-cognitive self-regulation, time and study environment, effort regulation, goal accomplishment and goal dissatisfaction were significant at $p < .0005$. Critical thinking, peer learning and help seeking were significant at $p < .01$. Rehearsal was significant at $p < .05$ level (Table 3, index). A further discriminate analysis between gender and the dependent variables revealed a strong significant result between gender and test anxiety $F=16.95$, organization $F=13.65$ and critical thinking $F=22.90$ with $p < .0005$.

The results showed that members of cluster 2 scored consistently higher on self-regulated learning indices compared with the two other clusters 1 and 3. Members of cluster 2 judged themselves to use more cognitive strategies, more resource management strategies, more meta-cognitive self-regulation strategies and more successful with their goals compared with the two other clusters. Members of cluster 2 rated themselves as high on observing and describing of inner experience, and brought at the same time non-judgment and non-reaction with their attention. This pattern is consistent with the two components Bishop et al. (2004) identified as important in producing the positive effects associated with mindfulness.

4. DISCUSSION

Bear et al. (2006) found a negative correlation between the non-judgment and the observing facet of mindfulness. She suggested that individuals without mindfulness meditation experience may not typically differentiate between inner observation of experience and the judgment of it. This pattern fits with the results in this study, however not all students showed this pattern. Members of cluster 3 had high observing scores and rated themselves to be judging towards their thoughts and feelings. Members of this cluster are consistent with previous findings (Bear et al., 2006). Members of cluster 2 scored high on both the observing and the non-judgment dimension. This supports the notion that individuals with the same patterns of responses as individuals with mindfulness meditation can be found within samples without meditation experience. This line of reasoning fits with literature that points to similarity between processes going on in mindfulness meditation with those going on in

everyday life. Unfortunately, meditation experience was not explicitly measured in this investigation. Members of cluster 2 may therefore represent a sample with significantly more meditation experience or yoga experiences than the other two clusters.

Cluster characteristics in relation to Bishop et al. (2004) two mechanisms of mindfulness reveal the three clusters to have three different patterns. Members of cluster 1 were characterized by very little self-focused attention and brought moderately affective-cognitive qualities with attention. Members of cluster 2 were categorized by self-focused attention combined with high scores on affective qualities brought with attention. Members of cluster 3 were self-focused, but scored very low on affective-cognitive qualities characterized by mindfulness.

Members of cluster 2 were the least test anxious. This cluster used consistently more learning strategies and was more goal-accomplished than the two other clusters. However, they may not be more adaptive because they were less test anxious, but because of their non-reactive and non-judgmental self-focused attention. This is consistent with studies conducted by Carver et al. (1983) and Evans et al. (2009). Self-focused attention has been associated with both adaptive and mal-adaptive regulation (Carver et al., 1983). For example Carver et al. (1983) found that self-focused attention may impede performance in anxious individuals, but facilitate performance in non-anxious individuals. Carver et al. (1983) argued that anxious individuals were not anxious for taking tests, but for being evaluated by others. In line with these studies cluster 2 had the lowest test anxiety scores. Evans et al. (2009) found that being less judging of inner experience was associated with persistence and perseverance in the face of obstacles. These studies support the notion that self-focused attention alone may not impede performance, but interacts with how feedback is interpreted. Studies conducted testing students goal orientation have shown that students that were oriented towards mastery persisted in the face of obstacles, but students that were oriented towards getting favourable judgment from others did not (Grant & Dweck, 2003).

This reasoning is consistent with the pattern of scores of cluster 3. Members of cluster 3 were equally self-focused as members of cluster 2, but differed in the affective qualities that accompanied attention. Members of cluster 3 scored the highest on test anxiety and tended to judge their inner experiences; thoughts and feelings.

Adaptive self-regulative learning, here measured as test anxiety, learning strategies and goal accomplishment, may be a result of a combination of both self-focused attention in combination with an attitude of acceptance and non-judgment towards inner experience. Cluster 2 uses consistently more learning strategies and were more satisfied with their goal accomplishments compared with the two other clusters. These results may reflect cluster 2's greater self-focused attention and that they therefore remember more specific events, however cluster 3 have comparable high scores on the two observing and description facets of mindfulness. Studies conducted on mood disorders have shown that depressive individuals tend to access general description of events from their autobiographical memories (Watkins & Teasdale, 2004).

The results indicated an interaction-effect between self-focused attention and affective-cognitive qualities of non-judgment and non-reaction. Self-focused attention combined with attitudes of non-judgment and non-reaction gives rise to greater awareness of present moment experiences, which may result in insights and an increased awareness of causalities between thoughts and feelings (Bishop et al., 2004). Such increased awareness may create room for discovering productive and unproductive thoughts and affect experiences that hinders or facilitates (e.g., of impulses and their push towards behaviour) goal behaviour.

Gender was found to be significantly related to test anxiety and critical thinking. It was furthermore a significant difference in the gender distribution between the clusters. The biggest difference in gender distribution was between cluster 1 and the two other clusters. Females are in majority in all three clusters, with as much as $\frac{3}{4}$ in cluster 2 and 3, and $\frac{2}{3}$ rd in cluster 1. Since members of cluster 1 and 2 seem to be equally anxious or un-anxious, it is suggested that the relative lower anxiety in cluster 1 is due to a relatively higher non-judgmental and non-reactive attitudes towards inner experience, rather than gender. Members of cluster 3 scored higher on test anxiety, this is probably attributed to their cluster profiles and not due to a greater per cent of either gender in the clusters.

This study supports the notion that students that are self-focused as well as non-judging towards their inner experiences are better at self-regulated learning. This pattern is consistent with the two mechanisms that Bishop et al (2004) characterized with mindfulness. One weakness with this study may have been that meditation experience was not measured. This was due to the belief that meditation experience would be extremely seldom in the student

population. Further study may explore this further as well perform controlled experiment explicitly training students in mindfulness meditation.

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APPENDIX

TABLES 1 – 6

TABLE 1 : Dimensional structure of mindfulness with Eigenvalue 1

	1	2	3	4	5	6	7	8
v6_28 Describing	.908	.057	.032	-.150	-.093	.112	-.160	-.078
v6_5 Describing	.882	.042	.039	-.115	-.146	.077	-.116	-.018
r6_14 Describing(SNUDD)	.840	.153	-.128	-.149	-.043	.208	-.017	-.056
v6_30 Describing	.831	.067	.118	-.136	-.138	.135	-.178	-.150
v6_29 Describing	.828	.091	.001	-.121	-.021	.177	-.184	-.076
r6_36 Describing(SNUDD)	.778	.103	-.033	-.143	-.041	.200	.003	-.050
v6_21 Describing	.714	.026	.096	-.044	-.170	.017	-.308	-.215
r6_6 Describing(SNUDD)	.709	.167	-.156	-.166	-.012	.151	.051	.081
r6_37 Nonjudgment(SNUDD)	.132	.863	-.024	-.153	.159	.225	.136	.048
r6_38 Nonjudgment(SNUDD)	.105	.849	.038	-.209	.116	.193	.050	.075
r6_31 Nonjudgment(SNUDD)	.035	.841	-.038	-.157	.143	.161	.158	-.093
r6_15 Nonjudgment(SNUDD)	.172	.783	-.043	-.062	.221	.285	.059	-.122
r6_39 Nonjudgment(SNUDD)	.136	.778	-.088	-.083	.180	.264	.092	-.055
r6_7 Nonjudgment(SNUDD)	.220	.730	-.004	-.128	.167	.309	-.054	-.253
r6_23 Nonjudgment(SNUDD)	.038	.718	-.109	-.164	.146	.066	-.002	.096
r6_22 Nonjudgment(SNUDD)	-.091	.687	-.105	-.127	.123	.079	.111	.118
v6_3 Observing	-.049	-.082	.777	-.015	.043	-.083	-.099	-.010
v6_2 Observing	-.032	-.022	.705	-.057	-.101	-.032	-.120	-.048
v6_33 Observing	-.008	.002	.650	-.190	.037	-.031	-.289	-.337
v6_4 Observing	.162	-.011	.641	-.204	.048	-.157	-.251	-.207
r6_35 Awareness(SNUDD)	.241	.143	.042	-.786	-.092	.362	-.044	-.018
r6_34 Awareness(SNUDD)	.241	.195	.054	-.764	-.013	.270	-.069	-.210
r6_19 Awareness(SNUDD)	.077	.155	.093	-.757	.007	.210	.001	-.107
r6_12 Awareness(SNUDD)	.047	.127	.118	-.756	-.097	.016	-.069	.065
v6_24 Non-reaction	-.109	.146	.005	.047	.761	.037	-.035	.076
v6_8 Non-reaction	-.112	.203	-.058	.133	.683	.024	.092	-.156
v6_1 Non-reaction	-.126	.110	-.084	.095	.675	.022	.112	.229
v6_17 Non-reaction	.072	.140	.097	-.111	.618	.067	-.398	-.094
v6_32 Non-reaction	-.019	.149	.081	.090	.531	-.063	-.200	.345
v6_9 Non-reaction	-.028	.160	-.001	-.031	.519	.087	-.049	-.214
r6_20 Awareness(SNUDD)	.099	.169	-.078	-.150	.001	.855	.046	.127
r6_13 Awareness(SNUDD)	.201	.106	-.088	-.202	-.031	.802	-.007	.074
r6_27 Awareness(SNUDD)	.152	.324	-.102	-.309	.066	.773	.094	-.099
r6_26 Awareness(SNUDD)	.126	.284	-.069	-.188	.172	.737	.052	-.224
v6_25 Observing	.344	-.152	.222	-.142	-.020	-.151	-.678	-.002
v6_10 Observing	.057	-.097	.261	.035	-.076	.061	-.659	-.281
v6_16 Non-reaction	-.132	-.145	.153	-.060	.317	-.178	-.569	.153
v6_11 Observing	.223	.038	.207	-.137	-.017	-.026	-.375	-.567
v6_18 Observing	-.092	-.161	.416	-.065	.114	-.178	.094	-.548

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

TABLE 2: Between item correlation for goal setting

	1. Jeg forstår nøyaktig hva jeg bør gjøre i studiet mitt	2. Jeg har spesifikke , klare mål å gå etter i studiet mitt	3. Målene jeg har i studiet mitt er utfordrende, men rimelige	4. Jeg forstår hvordan min innsats er målt i studiet mitt	5. Dersom jeg må nå mer enn ett mål, vet jeg hvilke mål som er mer og hvilke som er mindre viktige	6. Å jobbe mot mål gjør studiet mitt morsommere enn det hadde vært uten	13. Jeg har klare og langsiktige mål med studiene mine	10. Jeg klarer ofte ikke å nå målene mine.....	12. Noen av målene mine er i konflikt med mine personlige verdier	11. Jeg har altfor mange mål å nå i studiet mitt.....	9. Målene mine er altfor vanskelige...	8. Jeg blir veldig stresset av å jobbe mot målene mine
v8 1		.63**	.44**	.50**	.43**	.27**	.41**	.24**	.14**	.09*	.18**	.05
v8 2			.56**	.42**	.44**	.43**	.58**	.25**	.14**	.07	.14**	-.04
v8 3				.44**	.37**	.32**	.40**	.31**	.12*	.15**	.26**	-.01
v8 4					.46**	.28**	.27**	.25**	.14**	.08	.10*	-.01
v8 5						.30**	.26**	.27**	.13*	.11*	.14**	-.01
v8 6							.35**	.22**	-.05	-.02	.06	-.03
v8 13								.13**	.11*	-.07	.04	-.06
r8 10									.22**	.52**	.47**	.32**
r8 12										.25**	.22**	.15**
r8 11											.57**	.37**
r8 9												.48**
r8 8												

N 332 – 336. **= $p < .01$ level; *= $p < .05$ (2-tailed).

TABLE 3: Results from ANOVA between the clusters and Self-regulation facets.

Test anxiety F=21,56 $p < .0005$	Elaboration F=12, $p < .0005$	Time study envir. F=11.02, $p < .0005$	Help seeking F=4.81, $p = .009$
Rehearsal F=3.51, $p = .031$	Critical thinking F=4.58, $p = .008$	Effort regulation F=11.72, $p < .0005$	Goal accomplish. F=15.84, $p < .0005$
Organization F=8.51, $p < .0005$	Meta cog. Self-reg. F=18.86, $p < .0005$	Peer learning F=5.07, $p = .007$	Goal dissatisfaction F=18.94, $p < .0005$

Note: $p < .0005$ is reported when significance exceeds $p = .000$

TABLE 4: Dimensional structure of mindfulness

	1	2	3	4	5
DESCRIBING (Alpha .927) & (Average item-total inter correlation .76)					
28. Jeg kan sette ord på mine tanker meninger og forventninger	.91	.05	.09	-.16	-.08
5. Jeg er flink til å finne ord som beskriver følelsene mine	.88	.04	.06	-.11	-.13
30. Jeg kan vanligvis gi en ganske detaljert beskrivelse av hva jeg føler her og nå (i øyeblikket)	.83	.06	.16	-.17	-.11
29. Selv om jeg føler meg veldig opprørt, kan jeg finne en måte å uttrykke det med ord	.83	.08	.06	-.19	.01
14. Jeg har problemer med å finne riktige ord for å beskrive hva jeg føler om ting	.83	.15	-.09	-.23	-.05
36. Det er vanskelig for meg å finne ord for å beskrive hva jeg tenker	.77	.11	-.03	-.22	-.05
21. Jeg har en naturlig tendens til å uttrykke erfaringene eller opplevelsene mine med ord	.73	.00	.21	-.03	-.11
6. Når jeg har en følelse i kroppen, er det vanskelig for meg å beskrive den fordi jeg ikke finner de	.69	.17	-.14	-.20	-.04
NON-JUDGMENT (Alpha .911) & (Average item-total inter correlation .71)					
37. Jeg forteller meg selv at jeg ikke burde føle meg slik jeg gjør	.11	.86	-.09	-.24	.12
31. Jeg forteller meg selv at jeg ikke burde tenke på den måten jeg tenker	.01	.85	-.05	-.20	.09
38. Jeg tenker at none av mine følelser er dårlige og upassende og at jeg ikke burde føle dem	.09	.85	.00	-.25	.08
15. Jeg kritiserer meg selv for å ha irrasjonelle eller upassende følelser	.16	.78	-.07	-.24	.22
39. Jeg blir missfornøyd med meg selv når jeg har irrasjonelle tanker eller forestillinger	.12	.77	-.12	-.24	.17
7. Jeg tror noen av tankene mine er unormale eller dårlige, og jeg burde ikke tenke på den måten	.22	.72	.04	-.30	.17
23. Når jeg har ubehagelige tanker eller forestillinger, bedømmer jeg meg vanligvis som god eller dårlig avhengig av hva tanken eller forestillingen handler om	.03	.71	-.06	-.13	.12
22. Jeg pleier å dømme hvorvidt tankene mine er gode eller dårlige (onde)	-.11	.69	-.12	-.12	.08
OBSERVING (Alpha .691) & (Average item-total inter correlation .38)					
33. Jeg er oppmerksom på følelsen av vind i håret eller solen i ansiktet	.01	.00	.67	-.08	.04
4. Jeg legger merke til visuelle elementer i kunst og natur, slik som farge form, tekstur, eller mønster av lys og mørke	.17	-.01	.65	.01	.03
3. Når jeg dusjer eller bader, er jeg oppmerksom på følelsen av vann på kroppen min	-.05	-.07	.57	.07	.05
2. Når jeg går, legger jeg bevisst merke til følelsen av kroppen min som beveger seg	-.03	-.02	.54	.01	-.08
25. Jeg er oppmerksom på hvordan mine følelser påvirker mine tanker og min atferd	.39	-.20	.45	.04	.07
11. Jeg legger merke til hvordan ting lukter	.26	.02	.45	-.06	.01
18. Jeg er oppmerksom på lyder slik som tikkende klokker, fuglesant eller passerende biler	-.10	-.12	.44	.09	.04
10. Jeg er oppmerksom på hvordan mat og drikke påvirker kroppen, ankene og følelsene mine	.12	-.15	.44	-.02	.07
AWARENESS (Alpha .799) & (Average item-total inter correlation .45)					
27. Jeg forteller meg selv at jeg ikke burde føle slik jeg gjør	.14	.33	-.15	-.74	.07
20. Tankene mine vandrer ofte når jeg holder på med noe og jeg blir fort distraheret	.09	.16	-.25	-.71	.07
13. Jeg blir lett distraheret	.20	.09	-.19	-.70	.03
35. Jeg gjør ofte ting uten å være oppmerksom på hva jeg gjør	.22	.17	.21	-.70	-.20
26. Jeg syntes det er vanskelig å holde fokuset på det som skjer her og nå	.12	.28	-.12	-.65	.20
34. Det virker som jeg går på automatgir uten å tenke på hva jeg gjør	.23	.22	.29	-.62	-.13
19. Jeg haster gjennom aktiviteter uten egentlig å være oppmerksom på dem	.06	.19	.28	-.57	-.13
12. Jeg utfører arbeid eller oppgaver automatisk uten å være bevisst på hva jeg holder på med	.03	.16	.32	-.42	-.23
NON-REACTIVITY (Alpha .704) & (Average item-total inter correlation .42)					
24. Når jeg har ubehagelige tanker eller forestillinger, er jeg vanligvis i stand til å legge merke til dem uten å reagere	-.11	.13	-.02	-.01	.73
8. Jeg ser følelsene mine uten å fortape meg i dem	-.11	.20	-.07	.04	.65
17. Når jeg har ubehagelige tanker eller forestillinger, tar jeg vanligvis et steg tilbake og er bevisst	.10	.11	.25	-.11	.64
1. Jeg oppfatter mine følelser uten å måtte reagere på dem	-.14	.11	-.18	.03	.64
32. Når jeg har ubehagelige tanker eller forestillinger, føler jeg meg vanligvis rolig like etterpå	-.01	.12	.03	.10	.56
9. Når jeg har ubehagelige tanker eller forestillinger, legger jeg vanligvis merke til dem og slipper taket på dem med det samme	-.02	.16	.06	-.09	.49
16. I vanskelige situasjoner kan jeg ta en (mental) pause uten å reagere umiddelbart	-.09	-.19	.33	.10	.38

TABLE 5: Dimensional structure for Goal-Setting

Goal-setting v(8) 1, 2, 3, 4, 5, 6, 13, 12, 11, 10, 9, 8	1	2
GOAL - ACCOMPLISHMENT		
Alpha .824		
Average inter-item correlation .57		
v8_2. Jeg har spesifikke, klare mål å gå etter i studiet mitt	.84	.07
v8_1. Jeg forstår nøyaktig hva jeg bør gjøre i studiet mitt	.74	.14
v8_3. Målene jeg har i studiet mitt er utfordrende, men rimelige	.71	.19
v8_4. Jeg forstår hvordan min innsats er målt i studiet mitt	.68	.10
v8_13. Jeg har klare langsiktige mål med studiene mine (f. eks. å komme i ett bestemt yrke)	.67	-.07
V8_6. Å jobbe mot mål gjør studiet morsommere enn det hadde vært uten	.64	.14
v8_5. Dersom jeg må nå mer enn ett mål, vet jeg hvilke mål som er mer og hvilke som er mindre viktig	.59	-.02
GOAL – DISSATISFACTION		
Alpha. 740.		
Average Inter-item correlation .51		
r8_11. Jeg har altfor mange mål å nå i studiet mitt	.00	.81
r8_9. Målene mine er altfor vanskelige	.11	.81
r8_10. Jeg klarer ofte ikke å nå målene mine	.31	.70
r8_8. Jeg blir veldig stresset av å jobbe mot målene mine	-.12	.67
r8_12. Noen av målene mine er i konflikt med mine personlige verdier	.11	.43

Note: Locke and Latham (1990 s. 355) points out that their questionnaire may relate more strongly to a satisfaction scale than to performance because of no suitable goal difficulty items in the scale.

TABLE 6: TOTAL CORRELATION BETWEEN ALL THE INDICES

Goal-Disatisfaction	-.22**	<i>.11*</i>	-.17**	-.35**	-.36**	.39**	<i>.02</i>	-.04	-.13*	-.04	-.16**	-.17**	-.22**	-.13*	-.15**	-.20**
Goal-Accomplishment	<i>.17**</i>	<i>.11*</i>	.25**	.20**	.22**	-.08	.33**	.41**	.41**	.58**	.38**	.36**	.17**	.22**		
Help-Seeking	<i>.09</i>	-.04	.18**	.16**	.16**	-.14*	.18**	.28**	.22**	.32**	.28**	.67**				
Peer-Learning	<i>.07</i>	<i>.03</i>	.17**	<i>.12*</i>	.15**	-.08	.26**	.31**	.21**	.27**	.27**					
Effort-Regulation	<i>.01</i>	-.05	.14**	<i>.10</i>	.29**	-.07	.22**	.19**	.20**	.64**						
Time Study Environment	-.00	-.03	.18**	<i>.13*</i>	.35**	-.02	.24**	.30**	.25**	.34**						
Meta Cog-Self Regulation	<i>.12*</i>	.27**	.24**	<i>.11*</i>	.29**	-.12*	.30**	.51**	.57**	.46**						
Critical Thinking	.21**	.31**	<i>.09</i>	<i>.05</i>	<i>.02</i>	-.07	<i>.08</i>	.19**	.58**							
Elaboration	<i>.10</i>	.32**	.16**	<i>.06</i>	.15**	<i>.00</i>	.27**	.53**								
Organization	<i>.00</i>	.25**	.14*	<i>.11</i>	<i>.11*</i>	<i>.05</i>	.49**									
Rehearsal	-.04	<i>.11*</i>	.16**	-.04	<i>.04</i>	.19**										
TestAnxiety	-.19**	.22**	<i>.02</i>	-.37**	-.19**											
Awareness	-.00	<i>.03</i>	.24**	.32**												
Non-Judgment	.20**	-.12*	<i>.12*</i>													
Describing	-.05	.13*														
Observing	<i>.07</i>															
Non-Reaction																

NOTE: sig at .01 level are put in bold, sig at .05 level are put in cursive. N = 343 – 335. ** = $p < .01$; * = $p < .05$ (2 – tailed).

Between item correlations within the five facets of mindfulness

AWARENESS	r6.12	r6.13	r6.19	r6.20	r6.26	r.627	r.634
12. Jeg utfører arbeid eller oppgaver automatisk uten å være bevisst på hva jeg holder							
13. Jeg blir lett distrauert	.09						
19. Jeg haster gjennom aktiviteter uten egentlig å være oppmerksom på dem	.44**	.15**					
20. Tankene mine vandrer ofte når jeg holder på med noe og jeg blir fort distrauert	.06	.67**	.16**				
26. Jeg syntes det er vanskelig å holde fokuset på det som skjer her og nå	.07	.42**	.22**	.42**			
27. Jeg forteller meg selv at jeg ikke burde føle slik jeg gjør	.13*	.40**	.30**	.57**	.60**		
34. Det virker som jeg går på autmatgir uten å tenke på hva jeg gjør	.44**	.20**	.44**	.19**	.24**	.33**	
35. Jeg gjør ofte ting uten å være oppmerksom på hva jeg gjør	.46**	.27**	.49**	.29**	.22**	.35**	.63**

N = 336 – 342. ** = p < .01; * = p < .05 (2 – tailed).

DESCRIBING	r6 6	r6 14	r6 36	v6 5	v6 21	v6 28	v6 29
6. Når jeg har en følelse i kroppen, er det vanskelig for meg å beskrive den fordi jeg ikke finner de riktige ordene							
14. Jeg har problemer med å finne riktige ord for å beskrive hva jeg føler om ting	.68**						
36. Det er vanskelig for meg å finne ord for å beskrive hva jeg tenker	.48**	.63**					
5. Jeg er flink til å finne ord som beskriver følelsene mine	.59**	.69**	.65**				
21. Jeg har en naturlig tendens til å uttrykke erfaringene eller opplevelsene mine med	.32**	.47**	.49**	.59**			
28. Jeg kan sette ord på mine tanker meninger og forventninger	.57**	.72**	.67**	.78**	.65**		
29. Jeg blir misfornøyd med meg selv når jeg har irrasjonelle tanker eller	.47**	.60**	.63**	.69**	.58**	.74**	
30. Jeg kan vanligvis gi en ganske detaljert beskrivelse av hva jeg føler her og nå (i øyeblikket)	.47**	.58**	.59**	.70**	.60**	.74**	.73**

N = 336 – 343. ** = p < .01; * = p < .05 (2 – tailed).

NON-REACTIVITY	v6_1	v6_8	v6_9	v6_16	v6_17	v6_24
1. Jeg oppfatter mine følelser uten å måtte reagere på dem						
8. Jeg ser følelsene mine uten å fortape meg i dem	.38**					
9. Når jeg har ubehagelige tanker eller forestillinger, legger jeg vanligvis merke til dem og slipper taket på dem med det samme	.20**	.22**				
16. I vanskelige situasjoner kan jeg ta en (mental) pause uten å reagere umiddelbart	.15**	.15**	.10			
17. Når jeg har ubehagelige tanker eller forestillinger, tar jeg vanligvis et steg tilbake	.24**	.26**	.27**	.28**		
24. Når jeg har ubehagelige tanker eller forestillinger, er jeg vanligvis i stand til å legge merke til dem uten å reagere	.43**	.44**	.27**	.12*	.36**	
32. Når jeg har ubehagelige tanker eller forestillinger, føler jeg meg vanligvis rolig like etterpå	.30**	.21**	.21**	.20**	.24**	.35**

N = 333 – 342. ** = p < .01; * = p < .05 (2 – tailed).

OBSERVING	v6_2	v6_3	v6_4	v6_10	v6_11	v6_18	v6_25
2. Når jeg går, legger jeg bevisst merke til følelsen av kroppen min som beveger seg							
3. Når jeg dusjer eller bader, er jeg oppmerksom på følelsen av vann på kroppen min	.34**						
4. Jeg legger merke til visuelle elementer i kunst og natur, slik som farge form, tekstur, eller mønster av lys og mørke	.31**	.34**					
10. Jeg er oppmerksom på hvordan mat og drikke påvirker kroppen, ankene og følelsene mine	.18**	.14*	.17**				
11. Jeg legger merke til hvordan ting lukter	.14**	.14**	.23**	.28**			
18. Jeg er oppmerksom på lyder slik som tikkende klokker, fuglesant eller passerende biler	.19**	.21**	.23**	.09	.23**		
25. Jeg er oppmerksom på hvordan mine følelser påvirker mine tanker og min atferd	.10	.12*	.24**	.27**	.21**	.03	
33. Jeg er oppmerksom på følelsen av vind i håret eller solen i ansiktet	.27**	.39**	.36**	.22**	.15**	.28**	.22**

N = 336 – 342. ** = p < .01; * = p < .05 (2 – tailed).

NON-JUDGMENT	r6_7	r6_15	r6_22	r6_23	r6_37	r6_38	r6_39
7. Jeg tror noen av tankene mine er unormale eller gårlige, og jeg burde ikke tenke på den måten							
15 Jeg kritiserer meg selv for å ha irrasjonelle eller upassende følelser	.63**						
22 Jeg pleier å dømme hvorvidt tankene mine er gode eller dårlige (onde)	.39**	.43**					
23 Når jeg har ubehagelige tanker eller forestillinger, bedømmer jeg meg vanligvis som god eller dårlig avhengig av hva tanken eller forestillingen handler om	.44**	.48**	.61**				
37 Jeg forteller meg selv at jeg ikke burde føle meg slik jeg gjør	.57**	.63**	.48**	.53**			
38 Jeg tenker at none av mine følelser er dårlige og upassende og at jeg ikke burde føle dem	.58**	.62**	.53**	.53**	.77**		
39 Jeg blir missfornøyd med meg selv når jeg har irrasjonelle tanker eller forestillinger	.53**	.60**	.41**	.48**	.64**	.63**	
31 Jeg forteller meg selv at jeg ikke burde tenke på den måten jeg tenker	.56**	.63**	.53**	.53**	.74**	.66**	.60**

N = 336 – 340 ** = p < .01 * = p < .05 (2-tailed)

GOAL SETTING

Correlations

	1. Jeg forstår nøyaktig hva jeg bør gjøre i studiet mitt	2. Jeg har spesifikke, klare mål å gå etter i studiet mitt	3. Målene jeg har i studiet mitt er utfordrende, men rimelige	4. Jeg forstår hvordan min innsats er målt i studiet mitt	5. Dersom jeg må nå mer enn ett mål, vet jeg hvilke mål som er mer og hvilke som er mindre viktige	6. A jobb mot mål gjør studiet mitt morsommere enn det hadde vært uten	13. Jeg har klare og langsiktige mål med studiene mine	10. Jeg klarer ofte ikke å nå målene mine.....	12. Noen av målene mine er i konflikt med mine personlige verdier	11. Jeg har altfor mange mål å nå i studiet mitt.....	9. Målene mine er altfor vanskelige...	8. Jeg blir veldig stresset av å jobbe mot målene mine
v8 1		.63**	.44**	.50**	.43**	.27**	.41**	.24**	.14**	.09*	.18**	.05
v8 2			.56**	.42**	.44**	.43**	.58**	.25**	.14**	.07	.14**	-.04
v8 3				.44**	.37**	.32**	.40**	.31**	.12*	.15**	.26**	-.01
v8 4					.46**	.28**	.27**	.25**	.14**	.08	.10*	-.01
v8 5						.30**	.26**	.27**	.13*	.11*	.14**	-.01
v8 6							.35**	.22**	-.05	-.02	.06	-.03
v8 13								.13**	.11*	-.07	.04	-.06
r8 10									.22**	.52**	.47**	.32**
r8 12										.25**	.22**	.15**
r8 11											.57**	.37**
r8 9												.48**
r8 8												

N 332 – 336. ** = p < .01 level; * = p < .05 (2-tailed).

Between item correlation for learning strategies

TEST-ANXIETY	r7_13	r7_39	r7_50
13. Når jeg tar eksamen, tenker jeg på hvor dårlig jeg gjør det sammenliknet med andre studenter			
r7_39. Jeg føler meg urolig og nervøs når jeg tar eksamen	.42**		
r7_50. Jeg føler hjertet mitt slå fort når jeg tar eksamen	.24**	.67**	
r7_27. Når jeg tar eksamener, tenker jeg på konsekvensene av å mislykkes	.54**	.48**	.34**

N = 332 – 338; ** = p < .01; * = p < .05 (2 – tailed).

REHEARSAL	v7_44	v7_30	v7_16
44. Jeg lager lister med viktige ord og uttrykk, og pugger listene			
v7_30. Jeg pugger nøkkelord for å huske viktige begreper	.54**		
v7_16. Når jeg studerer, leser jeg egne notater og faglitteraturen om og om igjen	.30**	.28**	
v7_8. Når jeg studerer, gjentar jeg lærerstoffet høyt for meg selv om og om igjen	.19**	.23**	.26**

N = 337 – 338. ** = p < .01; * = p < .05 (2 – tailed).

ORGANIZATION	v7_1	v7_11	v7_19
1. Når jeg leser fagtekster i dette studiet, prøver jeg å lage meg en oversikt over stoffet som hjalp til å organisere egne tanker			
v7_11. Når jeg studerer, går jeg gjennom faglitteraturen og egne notater og prøver å inne ut av de viktigste ideene	.35**		
v7_19. Jeg lager enkle kart, diagrammer eller tabeller for å organisere lærerstoffet	.34**	.23**	
v7_34. Når jeg studerer, går jeg gjennom egne notater fra undervisningen og lager meg en oversikt over viktige begreper	.40**	.44**	.34**

N = 336 – 340. ** = p < .01; * = p < .05 (2 – tailed).

ELABORATION	v7_23	v7_33	v7_35	v7_38	v7_41
23. Når jeg studerer, ser jeg etter sammenhenger mellom informasjon fra ulike kilder som forelesninger, faglitteratur og diskusjoner					
v7_33. Når det er mulig, prøver jeg å relatere ideer i dette faget til de som inngår i andre fag	.54**				
v7_35. Når jeg leser, prøver jeg å relatere fagstoffet til det jeg allerede vet	.53**	.55**			
v7_38. Når jeg studerer, skriver jeg korte oppsummeringer av hovedideene i faglitteraturen og fra undervisningen	.27**	.25**	.23**		
v7_41. Jeg prøver å forstå lærerstoffet ved å se etter sammenhenger mellom faglitteraturen og innholdet i undervisningen	.50**	.46**	.49**	.38**	
v7_54. Jeg prøver å anvende ideer fra faglitteraturen i forbindelse med andre aktiviteter som forelesninger og diskusjoner	.49**	.44**	.48**	.17**	.48**

N = 332 – 338; ** = p < .01; * = p < .05 (2 – tailed).

CRITICAL THINKING	v7_7	v7_21	v7_37	v7_17
7. Jeg stiller ofte spørsmål ved det jeg hører eller leser om i dette studiet for å avgjøre om det er troverdige				
v7_21. Jeg ser på lærestoffet som et utgangspunkt for å forsøke å utvikle egne ideer	.41**			
v7_37. Jeg har mine egne ideer om hva jeg lærer i dette studiet	.41**	.41**		
v7_17. Når jeg får presentert en teori, en tolkning eller en konklusjon i undervisningen eller i fagtester, forsøker jeg å avgjøre om den virker holdbar	.66**	.43**	.42**	
v7_43. Når jeg blir presentert for påstander eller konklusjoner i fagtekster eller undervisningen, tenker jeg på mulige alternativer	.60**	.51**	.39**	.56**

N = 337 – 338. ** = p < .01; * = p < .05 (2 – tailed).

EFFORT REGULATION	v7_18	v7_46	r7_6
18. Jeg arbeider hard for å gjøre det godt i studiet selv om jeg ikke liker det vi driver med			
v7_46. Selv om lærestoffet er kjedelig og uinteressant, klarer jeg å forsette og arbeide med det til jeg er	.44**		
r7_6. Når jeg studerer, føler jeg meg ofte så lat eller så lei at jeg slutter før jeg har fullført det jeg hadde	.13*	.45**	
r7_31. Når studiearbeidet er vanskelig, gir jeg enten opp eller arbeider bare med de enkle delene	.14*	.36**	.43**

N = 336 – 338. ** = p < .01; * = p < .05 (2 – tailed).

TIME AND STUDY ENVIRONMENT	v7_4	v7_12	v7_36	v7_42	v7_45	r7_22	r7_49
4. Jeg studerer vanligvis på et sted der jeg kan konsentrere meg om arbeidet							
v7_12. Jeg utnytter studietiden min effektivt		.39**					
v7_36. Jeg arbeider vanligvis med studiet på et sted som egner seg til det		.74**	.38**				
v7_42. Jeg forsikrer meg om at jeg holder tidsplanen når det gjelder lesing og oppgaveløsning		.33**	.50**	.30**			
v7_45. Jeg følger undervisningen regelmessig		.13*	.29**	.18**	.28**		
r7_22. Jeg syntes det er vanskelig å holde meg til en tidsplan i studiearbeidet		.29**	.47**	.27**	.53**	.21**	
r7_49. På grunn av andre aktiviteter bruker jeg ofte for lite tid på studiearbeidet		.24**	.35**	.17**	.37**	.21**	.34**
r7_53. Jeg har sjelden tid til å repetere noteter eller faglitteratur før en eksamen		.26**	.35**	.22**	.25**	.18**	.30**
N = 334 – 340; ** = p < .01; * = p < .05 (2 – tailed).							

PEER LEARNING	v7_3	v7_15
3. Når jeg studerer, prøver jeg ofte å forklare lærestoffet til en medstudent eller venn		
v7_15. Jeg prøver å løse oppgaver sammen med med studenter		.43**
v7_20. Når jeg studerer, setter jeg ofte av tid til å diskutere stoffet med en gruppe med stud..		.56**
		.67**
N = 337 – 338; ** = p < .01; * = p < .05 (2 – tailed).		

HELP SEEKING	v7_29	v7_40	r7_9
29. Jeg spør læreren om å forklare begreper som jeg ikke helt forstår			
v7_40. Når jeg ikke forstår lærestoffet, spør jeg med studenter om hjelp		.26**	
r7_9. Selv om jeg har problemer med å lære stoffet, forsøker jeg å arbeide på egen hånd uten hjelp fra andre		.12*	.40**
v7_47. Jeg forsøker å finne fram til med studenter som jeg kan spørre om hjelp hvis jeg trenger det		.26**	.78**
			.39**
N = 334 – 338. ; ** = p < .01; * = p < .05 (2 – tailed).			

META-COGNITIVE SELF-REGULATION										
28. Jeg prøver å tilpasse den måten jeg studerer på til de ulike krav og undervisnings-former jeg møter										
2. I Undervisningen går jeg ofte grilipp av viktige poenger fordi jeg neker på andre ting.										
52. Hvis jeg blir forvirret når jeg skriver notater, forsøker jeg å finne ut av det etterpå										
51. Når jeg studerer, setter jeg meg mål som jeg forsøker å innrette studiearbeidet mitt etter.										
48. Når jeg studerer, prøver jeg å avgjøre hvilke begreper jeg ikke forstår godt										
32. Jeg prøver å tenke gjennom et emne og avgjøre hva det er meningen jeg skal lære av det, i stedet for bare å lese gjennom stoffet										
26. Jeg prøver å tilpasse den måten jeg studerer på til de ulike krav og undervisningsforemr jeg møter i studiet										
25. Jeg stiller spørsmål til meg selv for å være sikker på at jeg forstår det lærestoffet jeg har arbeidet med										
24. Før jeg går grundig gjennom nytt lærestoff, skummer jeg det ofte for å se hvordan det er organisert										
14. Dersom faglekstene er vanskelig å forstå, forandrer jeg måten jeg leser dem										
10. Når jeg syntese noe av det jeg leser i studiet er forvirrende, går jeg tilbake og prøver å finne ut av det										
5. Mens jeg leser, lager jeg spørsmål som jeg prøver å besvare selv										
5	.10	.15**	.17**	.54**	.22**	.36**	.19**	.13*	.14*	.15**
10		.16**	.13*	.17**	.30**	.16**	.35**	.21**	.27**	.15**
14			.17**	.18**	.18**	.14*	.29**	.24**	.14**	.10
24				.40**	.23**	.27**	.24**	.18**	.19**	.13*
25					.34**	.27**	.29**	.23**	.29**	.23**
26						.28**	.37**	.41**	.29**	.23**
32							.21**	.18**	.19**	.05
48								.34**	.23**	.21**
51									.30**	.10
52										.28**
R2										.46**
N = 329 – 340. ** = p < .01; * = p < .05 (2 – tailed)										