MEASURING LAZINESS THROUGH SELF-REGULATION USING HEART RATE VARIABILITY (HRV) BIOFEEDBACK

WAN RUSYAINI BINTI WAN MOHD

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SUPERVISOR'S DECLARATION

We hereby declare that We have checked this thesis and in our opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Humanities Technology (Human Performance System).

Signature

Name of Supervisor: ASSOC. PROF. DR. MUHAMMAD NUBLI ABDUL WAHAB

Position: DEPUTY DEAN (RESEARCH & DEVELOPMENT), CENTER FOR MODERN LANGUAGES & HUMAN SCIENCES UNIVERSITI MALAYSIA PAHANG

Date: 31 JANUARY 2015

Signature

Name of Co-supervisor: DR. ZURAINA BT ALI

Position: SENIOR LECTURER, CENTER FOR MODERN LANGUAGES & HUMAN SCIENCES UNIVERSITI MALAYSIA PAHANG

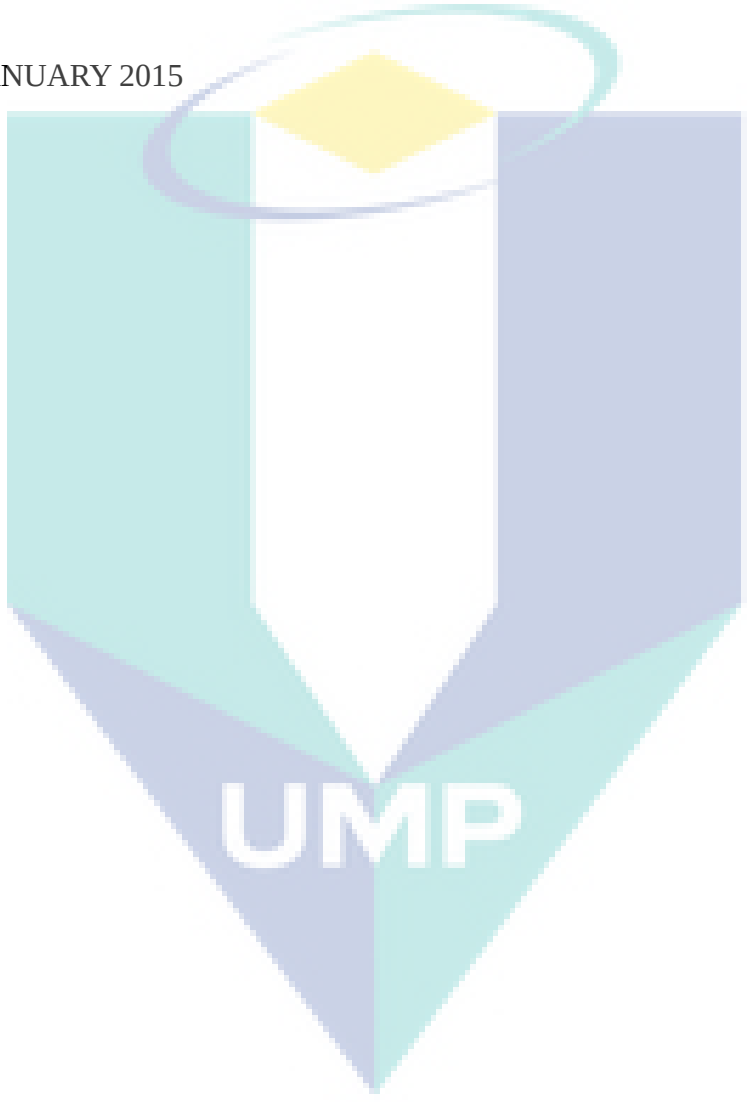
Date: 31 JANUARY 2015

Signature

Name of Co-supervisor: NORADILAH BINTI MD NORDIN

Position: LECTURER, CENTER FOR MODERN LANGUAGES & HUMAN SCIENCES UNIVERSITI MALAYSIA PAHANG

Date: 31 JANUARY 2015



STUDENT'S DECLARATION

I hereby declared that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

Signature

Name: WAN RUSYAINI WAN MOHD

ID Number: MBP12001

Date: 31 JANUARY 2015

Dedicated to my beloved children Adlan Syahin, Nurin Sorfina and Ain Khalila.

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ABSTRACT

Laziness becomes a common behavior among students in the learning processes and cognitive performance. This behavior appears within a person because of the failure in self-regulation and he/she normally experiences lack of achievement goal orientations in studies. As a result, lazy students have low enthusiasm in their way of thinking, tendency, habits and behavior. Thus, this study measured laziness through self-regulation by using heart rate variability (HRV) biofeedback technique. The objectives of this research are to design and test the biofeedback script as a measurement of their self-regulation's ability and to compare the HRV coherence score between low and good academic performances. Samples consisted of 20 students at the age of sixteen with different background of academic performances. They are assigned as the clinical experimental group (n=20) using emWave® PC Stress Relief System software developed by Quantum Intech, Inc. The samples received one session of clinical experiment consists of four protocols HRV biofeedback training within the duration of 12-20 minutes each. They were stimulated using the self-regulation script in the baseline, pre-recorded *zikr*, self-*zikr* and self-talk protocols. The self-regulation script was used to test their self-control to maintain the targeted goal of 100% LF (low frequency) coherence score. They were being taught on the method to achieve the targeted goal by implementing the diaphragmatic breathing technique and reciting the zikr of *La ilaha ilallah.* By using the Mann-Whitney t-test, One-Way ANOVA and Tukey's HSD Post Hoc test it was shown that the low academic performances have higher VLF (very low frequency) coherence score compared to the good academic performances. The higher scores in the VLF coherence score indicated that the low academic failed to apply the method of increasing the LF score. Thus, it showed that they failed to self-regulate themselves and were lazy to achieve the targeted goal. Meanwhile, the good academic performance could be categorized as the self-regulated when they successfully achieved the targeted goal in all protocols. They demonstrated persistence during the clinical experimental sessions. Through self-regulation, in terms of effort and persistence towards targeted goal, the levels of laziness were being investigated among different groups of academic performances. Results from the Mann-Whitney *t*-test showed that there was a significant difference in VLF Self-Zikr (p=0.05) where the mean value of low academic performance was higher compared to the good academic performance. The *t-test* revealed that the low academic performance failed to achieve the targeted goal which explained their low level of self-regulation. The LF activity was higher for the good academic performance in the biofeedback training using diaphragmatic breathing technique, zikr and self-regulation script. As a summary, low academic performances group demonstrated higher level of laziness compared to the good academic performances. Their performance and effort enhancement in the clinical experimental explained the levels of self-regulation which described their laziness.

ABSTRAK

Sifat malas telah menjadi satu tingkahlaku yang biasa di dalam kalangan para pelajar di dalam proses pembelajaran dan pencapaian kognitif. Tingkahlaku ini terjadi kerana kegagalan di dalam kawalan diri yang disebabkan oleh kurangnya orientasi matlamat pencapaian di dalam pembelajaran. Kesannya, pelajar malas mempunyai tahap kesungguhan yang rendah di dalam cara pemikiran, kecenderungan, tabiat dan tingkahlaku. Justeru, kajian ini akan mengukur sifat malas menerusi kawalan diri menggunakan teknik biofeedback perubahan kadar denyutan jantung (*HRV*). Objektif kajian adalah untuk merekacipta dan menguji skrip biofeedback sebagai ukuran keupayaan kawalan diri dan untuk membandingkan skor koheren HRV di antara mereka yang mempunyai pencapaian akademik rendah dan baik. Sampel terdiri daripada 20 orang pelajar pada usia enam belas tahun dengan pelbagai latar belakang pencapaian akademik. Mereka dikenali sebagai kumpulan klinikal experimental (*n*=20) yang menggunakan perisian *emWave® PC Stress Relief System* yang dibangunkan oleh Quantum Intech, Inc. Sampel menerima satu sesi eksperimen klinikal yang mengandungi empat protocol latihan HRV biofeedback berdurasi di antara 12-30 minit setiap satunya. Mereka diransang dengan menggunakan skrip kawalan diri di dalam protocol asas (*baseline),* pra-rakaman zikir *(pre-recorded zikr),* zikir sendirian *(self-zikr)* dan bercakap pada diri sendiri *(self-talk).* Skrip kawalan diri digunakan untuk menguji kawalan diri mereka dalam mengekalkan matlamat yang telah digariskan iaitu memperolehi skor 100% frekuensi rendah (*LF*). Mereka telah diajarkan kaedah untuk mendapatkan matlamat yang telah digariskan dengan melakukan pernafasan diafragma dan berzikir *La ilaha illallah.* Menerusi ujian *t Mann-Whitney, ANOVA* satu hala dan *Tukey's HSD Post Hoc,* ia menunjukkan bahawa mereka yang mempunyai pencapaian akademik rendah mencatatkan skor koheren VLF yang lebih tinggi berbanding mereka yang mempunyai pencapaian akademik yang baik. Skor VLF yang tinggi menunjukkan bahawa mereka yang mempunyai akademik rendah gagal untuk mengaplikasikan kaedah mendapatkan skor LF yang tinggi. Justeru, ini menunjukkan bahawa mereka gagal untuk mengawal diri dan malas untuk mencapai matlamat yang telah digariskan. Manakala, mereka yang mempunyai pencapaian akademik baik boleh dikategorikan sebagai orang yang berkawalan diri apabila berjaya mencapai matlamat di dalam semua protocol. Mereka menunjukkan sifat rajin sepanjang sesi klinikal eksperimen. Menerusi kawalan diri berkaitan usaha dan sifat rajin ke arah mencapai matlamat, tahap kemalasan dapat diselidiki di antara kumpulan pencapaian akademik yang berbeza. Keputusan daripada ujian Mann-Whitney menunjukkan bahawa terdapat perbezaan yang signifikan dalam VLF Zikir Sendirian (*Self-Zikr*) (p=0.05) bagi kumpulan pencapaian akademik rendah berbanding yang berpencapaian baik. Ujian *t* menunjukkan bahawa mereka yang berpencapaian akademik rendah gagal mencapai sasaran matlamat, seterusnya menjelaskan tahap kawalan diri yang rendah. Aktviti LF adalah tinggi bagi yang berpencapaian baik dalam latihan biofeedback menggunakan teknik pernafasan diafragma, zikr dan skrip kawalan diri. Kesimpulannya, mereka yang mempunyai pencapaian akademik yang rendah menunjukkan tahap malas yang tinggi berbanding mereka yang berpencapaian akademik baik. Pencapaian dan peningkatan usaha di dalam klinikal experiment ini menjelaskan tahap kawalan diri yang menggambarkan sifat malas mereka.

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b	Slope of least squares regression line
df	Degree (s) of freedom
f	frequency
H_0	Null hypothesis
H_1	Alternate hypothesis
m	Mean
r	Correlation coefficients
r^2	Coefficient of determination
t	Student's t variable
y	Dependent variable or response variable in regression analysis

LIST OF ABBREVIATIONS

ANS	Autonomic Nerves System
B	Baseline
HR	Heart Rate
Heart Rate Variability	Heart Rate Variability
HF	High Frequency
LF	Low Frequency
PNS	Parasympathetic Nerves System
PZ	Pre-Recorded Zikr
VLF	Very Low Frequency
SNS	Sympathetic Nerves System
ST	Self-Talk
SZ	Self-Zikr

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Generally, laziness occurs at anytime, anywhere or to everyone in their daily activities. Students feel lazy to finish their homework; not attending classes at school, failure to complete the given tasks assigned by teachers within the allocated time; workers delay organizing files; not settling their job; entrepreneurs relaxing in the office without planning anything for the company, graduates lazy to prepare their own resumes and everybody has many kinds of laziness. It is normal to feel lazy at certain time but it will become a crucial problem if the attitude is out of control. Hence, the person neglects to self-regulate or manage him/herself positively. Laziness among students has become a serious problem in schools which is closely related to some of the disciplinary problems.

From the psychology point of view, laziness is a behavior describing the passive attitude of a person with the tendency to avoid work although he/she is capable, unwilling to put forth efforts and choosing not to work hard and lack of will power (Beghetto, 2007; Mish, 1994, Ellis. 1991). An attitude can be defined as a tendency to think, feel, and an individual's response either positively or negatively towards particular objects or situation from the cognitive, affective, and behavioral perspectives (Bidjari, 2011; Salta & Tzougraki, 2004; Howarth, Fosters and Dorrer, 2004). A statement from Ellis (1991) stated that the will power consists of the strong determination towards individual's change, persistent of work and practice (Neenan, 2008).

Duru & Bakis (2014) in their research revealed that passive attitudes such as lazy or procrastination affect self regulation with relation to academic performance. By postponing academic tasks, students would fail to control themselves which then leads to stress, low academic performance and anxiety. However, by controlling their habits and routine in any given task, it would lead to the implementation of action in oneself (Sommer, 2013). Thus, by self-regulating oneself with routine and effort, a person could avoid from becoming lazy.

The positive tendency reaction affects the high commitment towards learning and student's interest which described the ability of a person in self-regulation (Simpson & Oliver, 1990). Moreover, some findings showed that attitudes lead to persistence, performance and achievement (Zain & Jusoh, 2010; Trumper, 2006; Siegel & Ranney, 2003). Meanwhile the negative outcomes such as procrastination, easily giving up, perform task with less effort etc. (Schouwenburg & Lay, 1995; Motie et al., 2012; Stead et al., 2010; Howell and Buro, 2009; Michinov et al., 2011; Steel, 2007; Qi et al., 2010).

Thus, from the above finding, it is proven that a passive attitude means a tendency to react negatively in their thinking, feeling and responses towards commitment and achievement. Although a lazy person has the tendency in reacting negatively towards certain event, it has been reported that this internal attribute could be controlled (Reyna, 2000). She suggested that laziness could be elaborated more from the self-esteem, motivation, attitudes in thinking and behavioral perspectives.

From the above findings, laziness is closely related to self-regulation within oneself. Any action taken was based on their decision to make it happen or just letting it go without any achievement. Their commitment towards any task or activity is the results of how they self-regulate or control themselves towards achievement. The challenges would make them competent within themselves or when compared to others. However, lazy students would fail to control or regulate themselves towards commitment and finally they would not achieve anything that would make them satisfied. Hence, this low motivation in desire and self-regulation would involve them in procrastination, social and disciplinary problems and finally would affect their performance in academic.

From the Islamic perspective, the habit of laziness is clearly stated in the Al-Qur'an, Al-Jathiyah 45: 15, "*If anyone does a righteous deed, it ensures to the benefit of his own soul; if he does evil, it works against (his own soul)*". This verse indicates the importance of the attitudes that would affect positively or negatively in oneself according to their action. Thus, whether a person becomes lazy or persistent, it would either benefit or degrade them. It is because any action or attitude will affect them directly as stated in the Al-Qur'an, Al Najm 53: 39, *"That man can have nothing but what he strives for."* Thus, good attitudes are important as being stated in the Al-Qur'an, Al-'Asr 103: 1-3, "*By (the Token of) Time (though the Ages). Verily Man in loss. Except such as have Faith and do righteous deeds and (join together) in the mutual teaching of Truth and of Patience and Constancy*". The verse indicates the importance of time management, in order to achieve productive results. Thus, Islam is against laziness or waste of time or any unproductive activity. By becoming lazy, the person will loose the opportunity to become successful.

The previous research also concluded that in the Islamic work ethics, being hardworking is important, in order to achieve balance within one's self and the social life. As hard work is a compulsory element in the work ethics, it will develop self-reliance within the practitioner. Finally, through commitment and hard work practices, a person would achieve success in the given task (Ali, 1987). His research has revealed that success has strong relationship with self-control or self-regulation, in terms of commitment. Hence, a lazy person demonstrated the lack of self-regulation control due to passive attitudes, having problems in time management and etc. Apart from that, recent findings illustrated the relationships of piety and morality with hardworking attitudes (Elci, Sener & Alpkan, 2011). From the regression analysis, they found that hard work was affected by both morality and piety. The regression model was found to be significant (f= 82,037; p=.00). Thus, based on the evidence from the above finding, it is concluded that lazy attitudes are wasting time (procrastination), low commitment and far from hard work attitude. Moreover, a hardworking person is committed in their task to achieve success. Yet, to overcome laziness, a person should practice positive attributes suggested by religious and moral perspectives.

A self-regulated person, which is normally called a successful one, strives for excellence, go beyond their comfort zones and gives full efforts. This kind of attitude was clearly stated in the Al-Qur'an, Al-Ankabut 26: 69, "*And as for those who strive hard in Our Cause, We will surely guide them to Our Paths. And verily, Allah is with the muhsinoon (good-doers).*" According to some similar research on this attitude, laziness can also be defined as the failure in self-regulation, self-efficacy and self-esteem (Bandura, 1997). One of the reasons contributing to failure in self-regulation is because of lack of achievement goal (Steel, 2007). As a failure of achievement goal orientation, laziness which involves inner motivation, has strongly impact the control of learning beliefs, task value, and intrinsic goal orientation (Pintrich, 1999; Araz and Sungur, 2007).

A recent study on analysis of self-regulation focusing on procrastination among university students defined this attitude as a tendency, habit and behaviour with low desire and ability to do something (Hussain and Sultan, 2010). By using the likert scale questionnaire, they found that 78% of students and 89% of teachers with their mean scores of 3.8 and 4.3 respectively, agreed that they involved in procrastination because of laziness. It has also been discovered that a procrastinating personality could not perform their duties correctly and on time due to emotional disturbances (Milgram 1991). These findings indicated that laziness appeared at any levels of age and academic background which negatively contributes to performance.

Besides that, from the physiological perspective, laziness is closely related to "antrieb". Antrieb is the inner driving force that maintains vitality, initiative, energy, focus, attention and efforts. Weak antrieb involves the left brain activities that include laziness, low energy, feeling of inner motor moving slowly and helplessness (Hohl Radke & Lundershausen, 2010). The brain involves neurophysiological measurement for the individual autonomic nervous system (ANS) which mobilizes the symphatetic and the parasympathetic nervous system (Thayer, 2005). A lazy individual normally uses less inner driving force and their physical.

Apart from there, many researchers found the causes of the similar attitude from various perspectives. Some of them that contributed to laziness are lack of commitment,

guidance, encouragement, time management skills, stress, social problems, and sickness (Blunt & Pychyl, 2000).

The main factor that drives the habit of laziness is because the failure in certain self-concept such as self-handicapping (Beck & Schmidt, 2012; Solomon & Rothblum, 1984); self-efficacy (Bandura, 1997); self-regulation (Van Eerde, 2003 & Steel, 2007); metacognitive self-regulation through achievement goal orientation (Howell & Watson, 2007; Pintrich, 2000) and self-regulation efficacy (Klassen, Krawchuk & Rajani, 2008).

The causes of this similar attitude have different elaboration from the earlier study. Based on the attribution theory, laziness or vice versa can be divided into several causes which are causality, controllability, and stability (Weiner, 1986). He stated that the behavior of someone will improve when lazy attitude disappeared. Earlier, Weiner and Mander (1977) pointed out that the causes of the attitude can be internal or external target of judgement. The cause of the attitude is either controllable by the person or not. Finally, they added the stability attribution as the causes perceived to persist at anytime, or short time. It implies that laziness depends on a person judgment whether to practice the attitude or not. This indicated that to become persistent or lazy, the person has the choices to involve in the activity by knowing the purpose of the task, controlling their mind and have stable decision making.

In a related work, Mccloskey (2011) underlined some of the symptoms of the similar attitude to laziness which are procrastination, low grades in examinations, degradation of health and constantly under stress. Lazy students who become procrastinators demonstrate negative attitudes academically such as being late in submitting assignments or losing them, bad time management and giving up in studying (Van Eerde, 2003). These symptoms were categorized by several studies as lack of self-discipline and self-regulation which is linked to time management, self-reinforcement, goal setting, and self-control (Schouwenburg & Lay, 1995; Tice & Baumeister, 1997).

Students who are dominant with laziness always avoid themselves from changing negative behaviours to the positive ones. This is because they are afraid to change (for example, fear of failure, fear without any reason and anxiety); being lazy

(refuse to do anything and choose not to work hard), low self-confidence and support (not confident to succeed and get support as well as encouragement from others) (Beghetto, 2007).

In parallel with the symptoms, there are many effects of laziness that were being recognized by previous studies. It has been reported that the effects of laziness appeared physically and psychologically within a person. It affects learning and performance goal (Prima, 2010; Pekrun, Schutz & Pekrun, 2007), cognitive motivational (Chen & Usher, 2012; Song & Chon, 2012), development of self-concept (Steel, 2008; Hussain & Sultan, 2010; Shah, 2000) and physical states (Ruffin, 2007; Schraw, Wadkins & Olafson, 2007).

As mentioned above in the definition, as a tendency with low desire and ability to do something, laziness would indirectly affect their students' personal character and learning. As a result, students experienced damages in self-efficacy, self-stability, self-control, aggressiveness and behaviour (Steel, 2008). This would make the students become lazy, passive and indecisive in taking initiatives or afraid to start doing something (Hussain & Sultan, 2010; Shah, 2000). A lazy student would show less effort and willpower to finish any task in activities (Shah, 2000). Research done by Irshad Hussain, Sarwat Sultan Irshad Hussain and Sarwat Sultan indicated that procrastinators, which are related to lazy individuals, have difficulties in finishing tasks as per requirement within the required time; finally will abandon it if they failed to finish the given task (Milgram, 1991).

Thus, according to the above mentioned research problems, this study focuses on the inability to maintain self-regulation as the indicator of laziness. It is reported that a lazy student shows lower level of self-regulation which is directly related to the performance of a person (Ferrari, 2001 & Steel, 2007). Research done by Ferrari (2001), found that a procrastinator has a low level of self-regulation which demonstrates the failure in managing stressful situation and having problems in the cognitive functions. Steel (2007) in his research concluded that procrastination, which closely related to laziness, showed a relationship between performance and motivation. Thus, the students' ability in managing stress while being given a task could be measured through

biofeedback quantitatively in order to investigate on how they self-regulate themselves towards performance.

Therefore, biofeedback could be used to scale the self-regulation ability among students from the psychophysiology perspective, in order to measure their laziness using the self-regulatory techniques which is Heart Rate Variability (HRV) Biofeedback (Gatchel, Robinson, Pulliam & Maddrey, 2003, and Mccraty, Atkinson & Tamasino, 2001).

According to John Stern (1964), a psychophysiology's work describes the connection between the mind and the body. It is about "any research in which the dependent variable (the subject's response) is a physiological measure and the independent (the factor manipulated by the experimenter) a behavioral one" (Stern et al., 2001). It has been reported that HRV which is known as a psychophysiological coherence enables the improvement of an individual's physiology condition such as nervous system function, emotional stability, and cognitive changes and work performance, etc. (Sutarto, 2012; Bradley et al. 2010, and Shahidi & Salmon, 1992).

Biofeedback is also known as a technique to control internal physiological responses from the received feedback or information and finally to make some amendments in the targeted behavior and method for altering HRV parameters and/ or reflex functioning (Wheat & Larkin, 2010; Gatchel et al., 2003).

Through HRV perspective, the autonomic nervous system of a person could be measured by investigating the spectrum power of the beat to beat interval in the heart rate (Akselrod et al., 1981; Pomeranz et al., 1985). This spectral analysis is the indicator of the balance in the autonomic nerves system that consists of the sympathetic and parasympathetic nervous system. It is a medium to detect the emotional states such as stress, anxiety, happy, joy, etc (Sutarto, 2012; Choi, Kim & Choi, 2011; Von Borell et al., 2007) and health condition (Kleiger et al., 1987; Bonaduce et al., 1999; Molgaard et al., 1991).

Most of the biofeedback done previously concentrated on stress and health problems. However, an investigation on attitudes is really limited as most of the research done previously were based on performance (Sutarto, 2012; Paul & Garg, 2012; Senik & Wahab, 2013), health problems (Bailon, 2010; Thayer, Yamamoto, & Brosschot, 2010), education (Peper, Harvey & Takabayashi, 2009; Bradley et al., 2007; Mccraty, 2005). Thus, a study on measuring laziness has to be done to relate biofeedback and behavior focusing on self-regulation among students.

Based on the HRV measurements, students who received the intervention program had learned how to manage their emotions and to self-activate the psychophysiological coherence state under stressful conditions. Moreover, students with high test anxiety exhibited decrement in HRV and heart rhythm coherence even during a resting baseline condition (without conscious use of the program's techniques). This indicated that biofeedback is beneficial in terms of individual's internal improvement (Mccraty, 2005).

A study on the cognitive performance by Sutarto (2012) has been implemented with a biofeedback protocol by using diaphragmatic breathing technique. To investigate the cognitive performance, the researcher has been using the D2 Attention Test, Sternberg Memory Test, Stroop Color and Word Test and mental arithmetic test. The experimental groups were being exposed to the biofeedback training by implementing the diaphragmatic breathing technique during the cognitive test. They were also being advised to practice the diaphragmatic breathing at home before undergoing the biofeedback training in the next session. However, the control group underwent the cognitive test without any biofeedback training. The ANOVA analysis revealed that the experimental groups made significant progress during the biofeedback sessions ($p<0.001$) in which there was an increament in the LF activity. The increase in the LF score was the result of lower respiration rate. Thus, the results yielded that the biofeedback training has impacted changes in the cognitive performance among female manufacturing workers.

1.2 STATEMENT OF THE PROBLEM

Research on attitudes and behaviors among students were widely discussed in the psychological domain only (Ridder et al., 2011; Elci et al., 2011; Hussain & Sultan, 2010; Beghetto, 2007; Reyna, 2000; Schouwenburg and Lay, 1995). Meanwhile, from the psychophysiology perspective, the research was considered as limited because most of the studies concentrated on education, in terms of performance (Bradley et al., 2007; Mccraty, 2005), health disorders (Whited, Larkin & Whited, 2014; Hynynen et.al., 2011; Bradley et al., 2007; Mccraty, 2005, Marijon et al., 2008) and work performance (Smolders, De Kort & Cluitmans, 2012). The research on education, health disorder and work performance did not discuss the element of attitude from the psychophysiology perspectives. Thus, studies on attitude such as laziness must be conducted, in order to explain it from the aspect of psychophysiology through the human physiological dimension.

In order to measure laziness from the psychophysiology perspective, a biofeedback technique has been considered to be the best mechanism. However, until now, there are limited studies focusing on the biofeedback protocol to measure attitudes especially laziness. Most of the biofeedback protocols were based on the treatment of stress (Gammage, Hardy & Hall, 2000) and clinical practice (Peper, Harvey & Takabayashi, 2009). Therefore, the limitation of research on biofeedback protocol has driven this study to explore it by measuring laziness using self-regulation protocols.

Moreover, the limited study discovering HRV using power spectrum or coherence score became an attraction to the researcher to discover and measure laziness. Mostly, other researchers were using HRV in the aspect of accumulated coherence score or peak analysis (Pumprla et al., 2002), heart rate and R-R intervals (SDNN) (Schroeder et al., 2004) and spectrogram using multiple spectral analysis (Hansson & Jonsson, 2006), tachnogram (Mccraty, Atkinson & Tamasino, 2001). Thus, this study will focus on the coherence score in the HRV.

Based on the research gaps between mind and body connection on attitude and limited data collection using coherence score HRV, has driven this study to explore laziness from the psychophysiology perspectives.

1.3 RESEARCH OBJECTIVES

The purpose of this research are:

- To design biofeedback script to measure laziness by investigating the self-regulation's ability among students.
- To test the self-regulation script on HRV score among students.
- To compare HRV coherence score between different group of students.

1.4 RESEARCH QUESTIONS

- What is the biofeedback script to measure laziness using HRV score?

1.5 RESEARCH HYPOTHESIS

- Lazy students have lower stress baseline compared to hardworking students.
- Lazy student are less capable in maintaining the achievement of LF compared to the hardworking students.
- Lazy students have higher score in the VLF compared to the LF and HF.

1.6 SIGNIFICANCE OF RESEARCH

This research must be conducted because it is important in the development of knowledge. It will further enhance the knowledge in the psychophysiology discipline with regard to the study of laziness.

The outcomes of this research could then be implemented as an application; to improve, overcome and reduce laziness among students in the future research work.

In addition, this research could provide a new dimension to the implementation of the National Education Policy, by assisting the Government and schools to detect negative behaviours in a student and finally develop an intervention plan to overcvome the problems. By developing an intervention plan for laziness through biofeedback training, the self-regulation among students will increase. Finally, it will affect the academic performance positvely by maintaining the self-regulation.

Furthermore, the outcomes of the study could be a guideline to detect laziness from the pscychophysiology persepectives for everyone in the society. At any levels of age, nature of work, communities, races and education, measurement of laziness has a big impact if it is implemented in the development of the country, physically and spirititually.

1.7 LIMITATION OF RESEARCH

Researches on attitude regarding laziness were widely discussed from the psychological perspectives (Khezri et al, 2010; Steel, 2007; Klassen, 2008). However, there is almost no research ever conducted on attitude from the aspect of psychophysiology dimension which explains the connection of mind and body. As laziness is caused by failure in self-regulation, this study explored this attitude to investigate the relationship between academic performance and self-regulation. In order to measure laziness, the variable in this study is the achievement goal orientation by using the Achievement Goal Theory (AGT). AGT is an integrated belief (goal orientation) that encourages students to approach, engage and respond to the achievement of tasks and situations in specific ways (Meece et al., 2006).

Moreover, as the research on attitudes using biofeedback technique was still limited (Whited et al., 2014; Wheat and Larkin, 2010; Shields, 2009; De Rogalski Landrot et al., 2007), this study investigated the self-regulation among students by using the HRV analysis. Most of the researches on HRV are based on education, health disorder and performance. Thus, this study will focus on HRV because self-regulation is closely related to the ability in managing stress, anxiety and other emotions towards success. The ability in managing stress, anxiety and emotion which is related to the

balance in the autonomic nerves system could be measured by HRV by investigating the beat to beat interval in the circulation of the heart beat (Saini et al., 2009; Bradley et al., 2007; Mccraty, 2005).

Besides that, the samples of this study were students at the age of sixteen who have problems in academic performances and disciplines such as not attending classes, smoking, negligence in obeying instructions from teachers, etc. Thus, at this age level, their attitudes and behaviors could still be nurtured and improved positively from the enhancement of self-regulation. This would increase achievement in the academic and finally in life. By avoiding or reducing laziness, their target in life could be achieved successfully, day to day. However, the results from the clinical experiment were an introductory to the measurement of laziness from the biofeedback training through heart rate variability judgment. There are some loops in the biofeedback training that could be enhanced in the future for mutual benefits. Loops in the time constraint, lack of training in the diaphragm breathing technique, implementation of an effective zikr during the clinical experiment and the preparedness to undergo experiment diligently were some of the gaps recognized in this study.

Thus, in order to develop a better biofeedback training, this study needs longer time to test their self-regulation through different kind of emotion or situation. Duration of the clinical experiment biofeedback training is crucial, in terms of effectiveness of the biofeedback training. A regular training within a month, for example, could develop self-regulation among students to overcome laziness. It would help them to control stress, emotion and this kind of self-regulation will lead them to success. Hence, some enhancement in implementation of biofeedback training could improve their ability in the goal orientation. Finally, it would nurture a new generation with strong willpower and are self-regulated towards achievement.

In some cases, although it is a stressful event, a self-regulated person would manage to overcome it and successfully meet the objectives or goals that have to be achieved. Thus, with a longer duration of the clinical experiment with interventions programs, laziness could be measured with huge influence in changing attitudes among students.

Furthermore, the replicate of samples is one of the factors that could confirm the validity and reliability of the biofeedback training through the protocols. A larger sample size would create complexity in data collection. However, the complexity is an important element to determine how accurate the biofeedback training using the developed protocols.

Apart from that, a research from the qualitative perspective would be an added value to the clinical experiment. The feedback on the training verbally, would give more information on the effectiveness of the protocols, ideas to improve the training, problem occurred within samples and other factors that would enhance the presentation and implementation of the training to measure and finally overcome laziness.

1.8 DEFINITION OF TERMS

Achievement Goal Theory (AGT)

Achievement goal theory stated that students' motivation can be usefully conceptualized as the purpose that students adopt when engaging any tasks in achievement situations. An achievement goal may focus on oneself efforts to achieve a positive target or to avoid a negative unwanted possibility (Pintrich, 2000).

Autonomic Nervous System (ANS)

Is the portion of the nervous system that controls the body organs and blood vessels, and transmits signals that control their functioning. It is also a major component in the emotional responses and any emotional and mental states. Autonomic Nerves System comprises of two branches of nerves which are sympathetic nerves system (SNS) and parasympathetic nerves system (PNS) which produces opposite responses (Schlindwein et al., 2008).

Mastery Goal Approach (MGA)

Mastery approach refers to engagement with the purpose of developing competence. It also involves defining success according to absolute standards of mastering task or according to intra-personal standards of improvement over previous achievements (Elliot, 1999).

Diaphragmatic Breathing

Diaphragmatic technique is a breathing pattern that involved the respiration rate of 6 to 8 breath per minute with a return of respiratory of sinus arrhythmia (Peper, 1998).

Heart Rate variability

The variation of natural pattern of fluctuation of heart rate according to the inhalation and exhalation cycle, measured by time interval between beats to beats. It is measured by the standard deviation of non-art factual inter-beat intervals. A sine wave pattern indicates balance in the Autonomic Nerves System (ANS) (Paul & Garg, 2012).

Laziness

Laziness is a behavior describing passive attitude of a person with the tendency to avoid work although he/she is capable physically. This attitude happened because of the failure in the achievement goal orientation that would affect the self-regulation within a person (Howell & Watson, 2007).

Parasympathetic nerves system

Is the nerves system that regulates the internal organs to react automatically without conscious in the growth and restoration body activities such as digestion, breathing and heart rate (Thayer et al., 2010).

Psychophysiology

The scientific study of interrelationships of physiological and cognitive processes, a psychobiology, a branch of physiology and a manipulation of physiology by observing human behavior. The human psychological variables could be facilitated, managed, guided, or hindered and thus to observe the effects of physiology of a person (Green et al, 1970).

Respiratory Sinus Arrythmn (RSA)

The entrainment effect of breathing processes which influences heart rate. The breathing processes consist of inhalation and exhalation cycles (Lehrer et al., 2000).

Self-regulation

Process of managing thoughts, behaviors, goals, and identity (Carver & Scheier, 1981; Rothbaum, Weisz, & Snyder, 1982) and self-control occurs only when people consciously and effortfully attempt to override potent, or dominant, responses to situations (Pychyl & Flett, 2012).

Sympathetic nerves system

Is a nerves system of a body responding to the emotional arousal such as fear, fright and fight. The changes in the external environment will affect the metabolic states of a body (Von Borell et al., 2007).

Spectrum Power / Coherence Score

Consists of three kinds of heart rate frequency's score which is Very Low Frequency (VLF), Low Frequency (LF) and High Frequency (HF) (Wheat & Larkin, 2010).

Very Low Frequency (VLF)

The frequency bandwidth in the heart rate is around 0.0033 to 0.04 Hz (Bailon et al., 2010).

Low Frequency (LF)

The balance in the sympathetic and parasympathetic nerves system with the range is around 0.04 and 0.15Hz (Bailon et al., 2010).

High Frequency (HF).

The frequency band in the spectral analysis with the range of 0.15 to 0.4 Hz (Bailon et al., 2010).

1.9 SUMMARY

In this study, Chapter 1 described an overview of laziness and the relationship with the Autonomic Nerves System (ANS) which is the important part of body in explaining emotions. As there is limited research being done from the psychophysiology perspectives, that is why this study has been generated to explore laziness behavior. Moreover, the lack of exploration using HRV technique and limited biofeedback protocol to measure laziness has become one of the problem statements of this study. In this chapter, the researcher also points out the research hypothesis, the significant and scope of this research and finally the definitions of terms that were being used in this study.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter discussed laziness from the six sub topics which influenced each other significantly. These sub topics consist of overview on laziness; self-regulation; achievement goal; biofeedback; heart rate variability; procedures of biofeedback training which consists of diaphragmatic breathing technique, communication and zikr (remembrance of *Allah*, The Exalted). In the first elaboration, it would discussed the definition of laziness from the psychophysiology perspectives. The symptoms and effects of this attitude would be explained deeply in this section.

In the second topic, self-regulation would be explained to describe how laziness happened and why it drives a person to that particular trait. In the third sub-topics, the achievement goal theory would explain how laziness has relationship with goal orientation that is closely related to intrinsic and extrinsic motivations. Meanwhile, the fourth and fifth discussion would give some overview of the Biofeedback and HRV techniques by covering the aspects of definitions, the relation between HRV with stress, anxiety, concentration, achievement and health. Besides that, the study highlighted the importance of measuring the behaviour of an individual. It would explain the Biofeedback protocol using HRV and the strategies to relate it with the biofeedback module.

Finally, there would be an overview on the procedures of biofeedback training that cooperate with the Diaphragm Breathing techniques, Self-Regulation Script Stimulation and *Zikr* (remembrance of God – *Allah*, The Exalted). These procedures

would elaborate the effectiveness towards increasing motivations within the research samples, in order to achieve their goals.

2.2 LAZINESS

The previous study demonstrated that laziness appeared because of the failure in self-regulation. The failure in self-regulation is directly related to lack of achievement goal within a person (Steel, 2007; Ryan & Deci, 2000). It showed that laziness has strong relationship with low achievement goal orientations related to the performance benchmark. Students with poor self-regulation failed to use the effective learning strategies and hold negative motivational beliefs such as low self-efficacy and low performance goal orientations. As a result, students with poor self-regulation frequently experience fear of failure and anxiety (Pintrich, 2000; Zimmerman, 2002).

From the learning processes and performance, it was reported that lazy students with anxiety disorder exhibited a passive attitude in their studies such as lack of interest in learning, poor performance in examination and do poorly in assignments (Prima, 2010). These anxiety psychological symptoms among students were fast heartbeats, nervous, panicking, feeling helpless while doing assignments, or lack of interest in difficult subjects (Ruffin, 2007).

More recently, Chen and Usher (2012), found that students who have negative emotions such as anxiety, giving up and boredom will discrupt their ability to maintain and continue their efforts and interest in any given task (Pekrun, Elliot & Maier, 2009; Weiner & Mander, 1977). These negative emotions such as anxiety will affect the performance goal among students. (Pekrun et al, 2002; Pekrun, Elliot & Maier, 2009; Schutz & Pekrun, 2007). Thus, the negative emotion would influence their capabilities in the cognitive, motivational and behavioral at any given task (Chen & Usher, 2012 and Song & Chon, 2012). Finally, anxiety trait would influence the level of efforts, persistence, resilience and performance (Bandura, 1997). Thus, students who failed to self-regulate the negative emotions would reduce efforts and persistence which, in turn would influence the performance.

Studies in the similar attitude stated that students failed to meet the performance expectation due to time constraints. It has been reported that students who practice laziness had low achievements in exams (*m*=4.2) and were loosing the competitive spirit (*m*=3.7) (Hussain & Sultan, 2010). Finally, lazy students exhibited anxiety, stress and depression (Schouwenburg & Lay, 1995; Ferrari, 1992). Related study also revealed that poor performance was affected by laziness (which is related to procrastination) among students. By using the trend analysis, a quadratic effect on procrastinations and performance indicated that lazy students had low motivation and decreased their efforts in the process of learning. However, the low procrastinators maintained high and stable motivation until the end of the course (Michinov et al., 2011).

Besides that, laziness will affect their ability in communication skills, weak in study management, low achievements, low quality assignments, anxiety, stress and weakness in self-regulation. Some similar attitudes produce negative behaviors such as late submissions of assignments, test and social anxiety, fear of failure, performing bad in academic and having mental health outcomes such as depression and anxiety (Dewitte & Schouwenburg, 2002). As reported in the similar attitude, lazy students who delayed intended actions, get lower result in their GPAs (Klassen, Krawchuk & Rajani, 2008).

With the similar attitude to laziness, previous studies also demonstrated the laziness effects as the same problems in stress, anxiety and health (Howell et al., 2009; Schraw, Wadkins & Olafson, 2007; Tice & Baumeister, 1997; and Wolters, 2004). Although a lazy student was in a relaxed condition of not doing anything or doing it with less effort, he/she would still experience stress. This was because the demand from external requirement such as teachers, parents and school gave them pressure to meet the requirement of any given task. Finally, some of them were in stress and demonstrated the physiological symptoms include sweaty palms, cold, nervousness, panic, fast pace of breathing, racing heartbeat, or an upset stomach (Ruffin, 2007).

Previously, Klassen et al. (2008) investigated the relationship between similar attitude to laziness and self regulation. They found that there was a strong relationship between lazy and self-regulation. Using the Motivated Strategies for Learning

Questionnaire, they found that students who have higher levels of self-regulation reported lower levels of laziness. Meanwhile, self-regulation and self-esteem significantly predicts procrastination where laziness is one of the criteria in the attitude.

As laziness happened because of failure in the self-regulation within oneself, thus it is important to measure this attitude by investigating their level of efforts, staying power and self-control. By addressing the targeted goal as a benchmark to their achievement, we could investigate on how they self-regulate themselves towards success. Thus, the explanation on the self-regulation would be elaborated further in the discussion as follows.

2.3 SELF-REGULATION

In order to measure laziness, students would be investigated psychologically on what makes the attitude or behavior happened and what processes involved underlying it. Thus, self-regulation would be the best mechanism to describe how laziness happened and why it drives a person to that particular state. According to the causes of laziness, this trait happened because of lack of self-regulation within a student which is a result of failure in achievement goal orientation (Steel, 2007). Most students who are weak in self-regulation and emotions, fail to practice effective learning strategy. In fact, they possess negative motivations such as low self-efficacy and low achievement goal orientation.

It has been reported that a person who exhibited low self-regulation was applied lower task persistence (Vallerand & Bissonnette, 1992). A non-self-regulated student always becomes afraid and anxious (Pintrich, 2000; Zimmerman, 2002).

A previous study has revealed that a higher self regulated person exhibited high self-efficacy, had strategies in learning and finally posits good performance (Wang & Wu, 2008). They agreed that self-regulated students have higher motivation. From that particular self value, they implemented a better learning strategies with their own initiatives and respond actively on any situational demands (Jang & Liu, 2011). The regression analysis showed that students who had higher self-efficacy employed more

learning strategies. Meanwhile, their research found that there was a significant difference in using higher-level learning strategies, such as elaboration and critical thinking skills, between students whose have higher or low self-efficacy (Wang & Wu, 2008). Thus, this finding indicates that self-efficacy in an important value in the self-regulation among students, in order to demonstrate performance and achievement in learning.

It has been also reported that self-regulation is an important elements in goal-setting, planning, executing, managing, monitoring and self-evaluating (Kharrazi & Kareshki, 2010). It brings a meaning that self-regulation influences motivations, thoughts, emotional states and patterns of behavior among individuals.

As a conclusion, self-regulation could be defined as the active and constructive process in the goal setting activity. The ability to monitor, regulate and control their cognition, motivations and behaviors were guided by the goal orientation (Pintrich, 2000).

The ability in controlling action would drive motive towards given task in certain qualities. As an inner motivation, a self-regulated individual would focus on excellence, efforts to improve task towards goal orientation (Ryan & Deci, 2000; Qi et al., 2010). In fact, they take seriously any given task, do it with persistence and have strong will to achieve their goals by using different strategies (Pokay & Blumenfeld, 1990; Simon, Vansteenkiste & Lens, 2004). Meanwhile, students with low intrinsic motivation, possess low endurance, giving up, less efforts towards desired goal (Pychyl & Flett, 2008; Beghetto, 2007; Prima, 2010).

Thus, recent and previous studies have defined self-regulation as a general process in managing thoughts, behaviors, goals, and identity (Vandellen, Hoyle & Miller, 2012). As being passive, lazy students may disrupt the learning processes and social skills (Paulsen et al., 2006) and have problems in academic achievement and opportunities in social interaction (Chazan et al., 1998).

Pintrich (2000) in his study observed self-regulation among students and he found that self-regulated students were more motivated academically than other student. Successful students, in terms of academic demonstrate similar attitudes and character in the learning processes. Most of them are self-regulated with similar intrinsic motivation such as effort, vitality and will power (Ning & Downing, 2010; Perry et al., 2008; Liew & Mctigue, 2008; Cleary, 2004). This attitude is obviously opposite from laziness which demonstrates less effort, not doing anything, unwilling to put forth effort, etc.

More recent, a study on self-regulation demonstrated a positive and significant effects on the academic performance among students (Lavasani et al., 2011). This implies that students who are self-regulated have higher level of academic motivation and self-efficacy in learning. From their study, they found that self-regulated students were insisted in their efforts and used appropriate strategies to meet their goals.

The process underlying the motivational self-regulation are self-efficacy and goals (Seo & Ilies, 2009) as shown in the Figure 2.1. In this elaboration, it would show the method of setting goals towards striving for achievement. Recent research done by Seo and Ilies (2009), examined the relationship between self-efficacy and performance by using the Internet-based stock investment simulation. The stimulation was done to evaluate sample's effort to achieve performance goals. They found that self-efficacy was positively related to effort and performance that were influencing sample's self-efficacy. Results from the study showed that past performance positively predicted self-efficacy and self-efficacy was positively related to goal level.

According to Bandura's theory, the ability to achieve the desired action was called self-efficacy. This self-efficacy value is a belief to increase motivation and performance by increasing efforts or persistence towards goal system (Bandura, 1997, 2001). Thus, self-efficacy in self-regulation determined the academic behaviors and task persistence (Good & Brophy, 2000; Meece, Anderman & Anderman, 2006; Gilman & Anderman, 2006), which described an intrapersonal beliefs to perform given tasks or activity (Diseth, 2011; Yusuf, 2011). Parallel with that conclusion, low self-efficacy students have negative thoughts towards the task given. Thus, it would affect their performance goal.

Recent study also in unison with the Bandura's theory which revealed that there was a significant positive relationship between self-efficacy, motivation and performance (Seo & Ilies, 2009). They found that self-efficacy was positively directed towards performance where self-efficacy was positively correlated with performance between the levels of analysis. They found that a person with high self-efficacy would spend more time on the given task, and finally would achieve higher performance towards the desired goal.

It is believed that self-regulatory skills provides on staying power of a person along the way to achieve goals (Bandura, 1994). This capability in self-regulation would affect learning strategies, completing schoolwork, active in class learning and finally influence the academic performance or achievement. This belief in oneself has important roles in their behavior towards academic achievement (Klassen, 2007; and Zimmerman, 2002). The lacks of self-regulatory practice among lazy students would give negative impact to their learning and achievement (Cleary, 2006; Lavasani et al., 2011).

Based on the Self-Regulation Strategy Inventory Self Report (SRSI-SR) developed by Zimmerman, one of the self-regulation strategies is goal setting (Zimmerman, 2000; Cleary, 2006). This motivation variable produced effectiveness in managing and regulating behaviors (Weinstein, Husman and Dierking, 2000) which have positive impact on the academic achievement (Bandura, 1997; Pintrich, 2000; Lavasani et al., 2011). Thus, this indicated that a person, who has a goal to achieve a targeted task, would self-regulate him/herself towards success. Meanwhile, whoever does not have goal in their daily activities, could not manage or control themselves in any action. Thus, they will become lazy to achieve anything in life.

Cleary (2006) in his study on the development and validation of the Self-Regulation Strategy Inventory-Self Report (SRSI-SR) found that high achiever reported engaging in less maladaptive behaviors. The low achievers, in terms of academic performance, would always try to avoid any challenging activities and were disorganized. They were reported to avoid difficult tasks or exhibited negative behaviors by giving up, avoiding tasks when in confusion. These findings indicated that

self-efficacy, interest, and value of a particular task will influence one's effort and persistence (Bandura, 1997) and then influenced the academic achievement (Byrnes, 2003). From the above findings on self-regulation's criteria, it was deduced that lazy students involved in more maladaptive behaviors that finally would affect their academic achievement negatively.

According to the illustration in the Figure 2.1, in order to nurture self-regulation, the processes involved are self-efficacy and attaining goal. A self-regulated person is someone with high self-efficacy (Bandura, 2001). This is because a self-efficacy person is someone with beliefs in his/her capabilities to perform a specific action required to attain a desired goal (Luszczynska & Schwarzer, 2005). Meanwhile, a failure in implementing self-regulation demonstrates low self-efficacy. Thus, a self-regulated person would put full effort in attaining the desired goal and this is in contrast with a person who fails in self-regulatory. In the process of affecting human behavior, there are four psychological processes of self-efficacy which are cognitive, affective, motivational and selection processes as shown in the Figure 2.1.

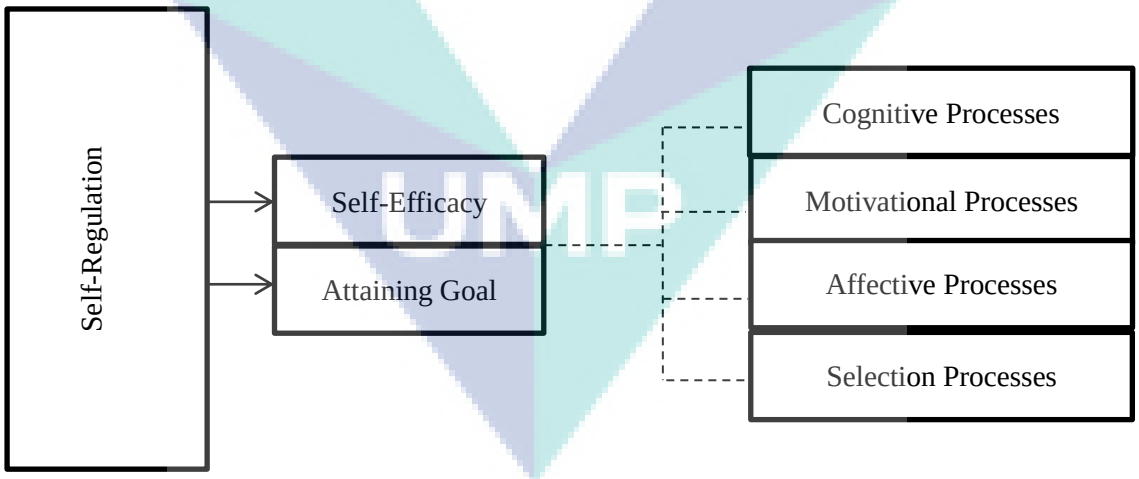

Figure 2.1: Process of Self-Regulation

Source: Bandura, 1994

Besides, the elements of self-efficacy in the process of self-regulation are within a person, who is attaining goal. Action directed goal has an expectancy of assessment.

For example, if a person positively expects success, he/she would direct efforts towards the desired goal as shown in the Figure 2.2 in the flowchart of self-regulatory possibilities. Moreover, if a person negatively expect the result of an action, it will discard efforts and potentially decide to disengage from the goal (Carver and Scheier, 1990a, 1990b).

It has been found that a self-regulated person did better academically than a non-self-regulated (Schunk & Zimmerman, 2007). A self-regulated person manipulated their own performances as a self-efficacy of self-regulation (Schunk, 1995). They are known to have the ability to manage acacemic performance. Moreover, Caprara et al. (2008), while investigated the self-regulatory efficacy, found that a non-self-regulated person had lower grades from junior to senior high school due to failures to achieve goal.

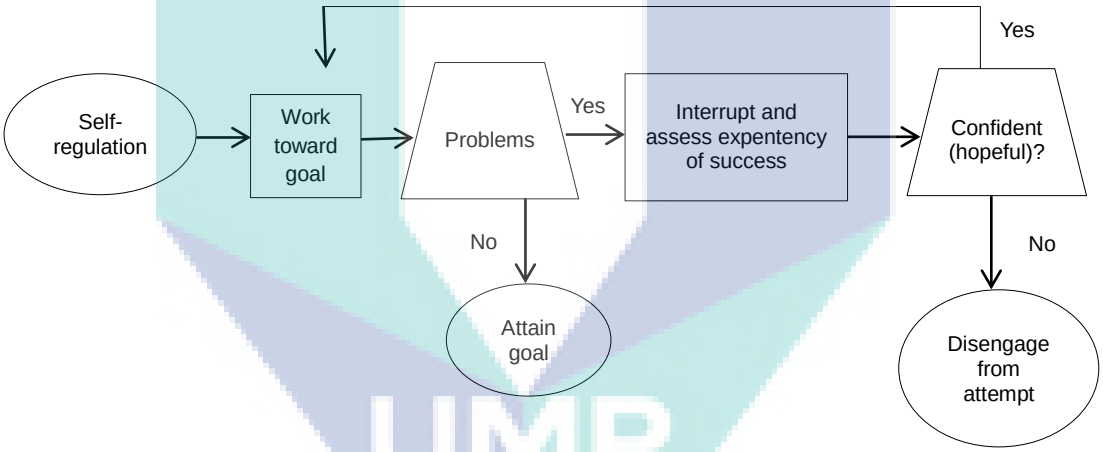

Figure 2.2: Flowchart of Self-Regulatory Possibilities

Source: Carver and Scheier, 2001a

As mentioned in the above explanation, the lack of self-regulation is because of the failure in achievement goal approach which is related to the intrinsic goal orientation. Thus, it is important to study on intrinsic motivation as an inner driven motive with inherent qualities in any given task or activities and an element that constitutes it and the underlying processes involved (Ryan & Deci, 2000). So this studies, will elaborate further on the the self-motivational belief, focusing on self-regulation. Past research demonstrated a strong relationship between self-regulation

process and academic achievement (Bandura, 1997) towards students' motivation and school success (Cleary, 2006).

In explaining the goal attainment, further discussion would elaborate more on the topic of the Achievement Goal Theory.

2.4 THEORETICAL FRAMEWORK: ACHIEVEMENT GOAL THEORY (AGT)

Previous studies had shown that goal is crucial as a form of achievement or performance. In the theory of motivation developed by Locke and Latham in 2002, goal and performance has a strong relationship (Lunenburg, 2011). During the past two decades, students' goal orientation has driven an understanding on achievement motivation in education (Ames, 1992; and Dweck & Leggett, 1988). Nowadays, investigation in achievement goal orientation in terms of motivation, spread tremendously in many disciplines of knowledge especially in sport psychology, education and social (Adesope, Gress & Nesbit, 2008). It was indicated that goal setting has positive impact to the behavior which described goal as a motivation in achieving success (Gammage, Hardy & Hall, 2000). Past research revealed that motivation is the indicators of task persistence and academic behavior among youth (Good and Brophy, 2000; Meece et.al, 2006; Gilman and Anderman, 2006).

Thus, a motivated person would put full efforts, has strong will power; try to master the task and other positive attitudes or behaviors to succeed. The energy of behavior towards positive stimulation could be nurtured through achievement goal's orientation by putting efforts to get positive results (Elliot, 2006; Elliot & Murayama, 2008). An effort or getting positive results depends on the level of someone's competence. If it involves an intra-personal purpose, achievement is based on the mastery task goal without comparing with other's performance (McGregor & Elliot, 2002). Previous study showed that goal is the important element in driving performance. From the intention of goal, it would direct to the efforts and persistence strategy. Finally, it would influence behavior or performance towards the outcomes (Lunenburg, 2011).

As a summary, laziness is caused by failure in self-regulation which is induced by the lack of achievement goal orientation. From the pscycholocy perspective, by focusing on the mastery goal, student's performance is based on his/her own achievement without comparing with others. In order to investigate the students' performance from the pscychophysiology perspective, biofeedback training is one of the mechanisms to enhance their ability in certain task. Furthermore, the heart rate variability analysis has been proven as a measurement in quantifying the mind-body connection to describe attitude such as laziness which could be explained in the theoretical framework as follows in the Figure 2.3.

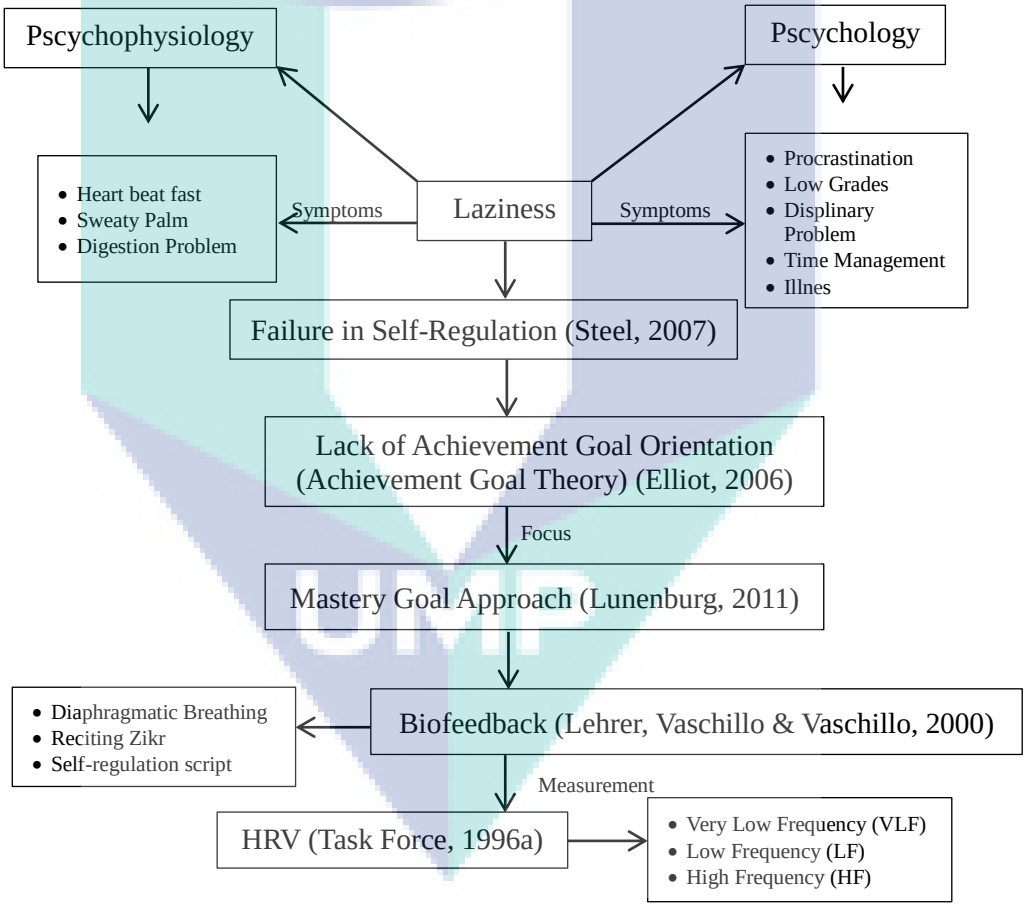

Figure 2.3: Theoretical Framework

To nurture the achievement goal orientation, some of the researchers have proposed a framework to investigate the relationship between goal and achievement (Dweck & Leggett, 1988). Pioneered from a framework by Dweck and Leggett (1988),

it is expanded to a dichotomous, trichotomous framework constructed by Elliot, (1999); Elliot & Church (1997); and Elliot & Harackiewicz (1998) and finally a 2x2 Achievement Goal Framework (Elliot, 1999; Pintrich, 2000) has emerged as an achievement goal theory (as shown in the Figure 2.4).

From the framework, they emphasized on the mastery and performance goal approach (Elliot, 1999; Qi et al., 2010; Dweck, 1986; Finney, Pieper & Barron, 2004). They divided the achievement goal into four orientations which are mastery goal approach and mastery avoidance approach which involve achievement within a person. Meanwhile, performance goal approach and performance avoidance approach involve achievement relatively with others (Jang & Liu, 2011; Elliot & Murayama, 2008; Finney, Pieper & Barron, 2004).

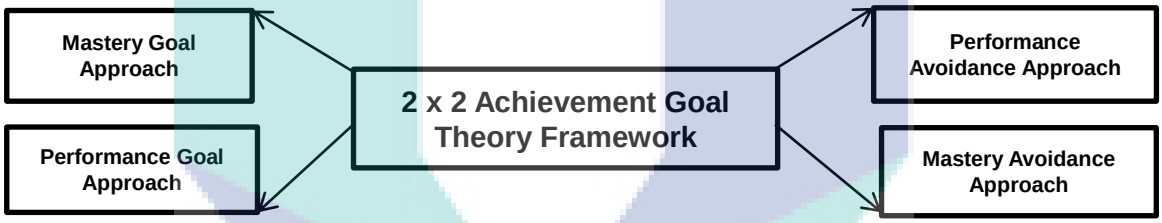

Figure 2.4: 2x2 Achievement Goal Theory Framework

Adapted from: Cano and Berben (2009)

The framework of achievement goal theory was created to investigate the self beliefs, achievement values and goals. These three kinds of orientation are important in order to investigate their level of motivation and achievement (Wigfield & Cambria, 2010).

From the achievement goal framework (as shown in Figure 2.4), the mastery goals approach is a competence within intrapersonal standards. It has been reported to demonstrate more positive outcomes compared to the performance goal approach (Schunk & Zimmerman, 2007; Ames, 1992). Students who demonstrated an interest in gaining knowledge or master in any given task, known to perceive mastery orientation

(Adesope et al., 2008). They had personal orientations and knew well whether to engage or avoid achievement (Adesope, Gress & Nesbit, 2008; Carver & Scheier, 2001a). Finally, the mastery goal would develop a deep learning strategies, self-efficacy, self-regulation in achieving goal (Madjar, Kaplan & Weinstock, 2011; Stoeber, Pescheck & Otto, 2008; Ames, 1992; Dweck & Legget, 1988).

However, an intra-personal purpose depends on the intention of goals, as intention is a psychological processes that affect efforts and attention (Wilson, Peper & Schmid, 2006). A person who has goal would put the maximum efforts that will affect his/her achievement or performance (Latash & Jaric, 1998; Theodorakis, Laparidis & Kioumourtzoglou, 1998). Thus, a person would concentrate on the activities or task, regardless of other individual's performance. This indicated that an intra-personal purpose would direct to concentration, in order to develop strategies. Previous studies have proven that concentration leads to winning competition among athletes as they perform the ability in controlling thoughts, arousal and attentional focus (Theodorakis, Laparidis & Kioumourtzoglou, 1998; and Wilson, Peper & Schmid, 2006). For example, a gold medal winner in Olympic 1984 stated that her goal is only to perform the best of her ability and did not bother about other competitors (Botkin, 1994). Thus, an intra-personal purpose towards achieving a goal is an important element in self-regulation.

This intrinsic interest or motivation would keep individuals engaging in any given task at their own qualities (Ryan & Deci, 2000). Usually, students who have this kind of intrinsic motivation would doing it, strive for excellence, goal directed, putting efforts to understand and improve task or material in depth, think that a task is important and useful and have different strategies in achieving their goal (Qi et al., 2010, Simon, Vansteenkiste & Lens, 2004). Therefore, by using mastery goal, a person who acts towards goal setting would put maximum efforts that influence his/her performance (Latash & Jaric, 1998; Theodoraakis, Laparidis & Kioumourtzoglou, 1998), without bothering other people's performance. This approach focuses on positive strategy in goal orientation such as attaining new skills and improving competence within one's self. They usually would give full effort to understand and learn new skills and show persistence. Meanwhile, the mastery avoidance approach is to avoid negative

possibilities such as losing skills or unable to compete. Their goal is to avoid misunderstanding and not to forget the lesson (Finney, Pieper & Barron, 2004).

Meanwhile, Khezri et al. (2010) in their research found that performance goals and mastery goals approach were related to self-regulating strategies (Elliot, 1997; Elliot & Church, 1997; and Pintrich, 1999). A student, who implements the mastery goals, will use a deep approach in a positive way. Meanwhile the task value had a direct effect on mastery goals and deep approach. This indicates that a person who has intrinsic motivation will master and has deep intention in finishing the given task, finally will implement strategies in learning processes. Dweck (1986) described a person who has intrinsic motivation as an individual that seek to increase their competence or master something new as his/her goal orientation (Finney, Pieper & Barron, 2004).

Beghetto (2007) also added that students who have mastery goal orientation exhibited high levels of efforts and engagement, implementing adaptive learning strategies, showed interest in learning, dare to experience challenge and difficulties (Ames, 1992; Urdan, 1997). They believed successful is driven by hard work and persistence and are able to learn from mistakes (Kong & Hau, 1996). As a result, a mastery goal approach is the positive predictor to achievement (Izadikhah, Jackson & Loxton, 2010).

Meanwhile, the low-academic abilities are known to use the performance-avoidance orientation that has been linked to maladaptive behaviors. They are involved in cheating, avoiding help when needed, less effort, and procrastinate. This maladaptive behavior is closely related to the symptom of laziness (Elliot & Church, 1997; Urdan, 1997; Beghetto, 2007). It was indicated that low academic performers tend to demonstrate negative attitudes whenever the expectation of gaining rewards did not develop as what they desired. Thus, they exhibit low performance compared to others. However, Beghetto (2007) in his study revealed that performance avoidance is not a sign of laziness but it is resulting from lack of confidence and support. Although Beghetto's finding is not parallel with the previous ones, more recent research proved

that performance avoidance has negative impact on the achievement (Wigfield & Cambria, 2010).

More recently, research done by Jang and Liu (2011) using the cluster analysis, revealed the presence of five clusters of students with significant differences in terms of academic goal profiles. They found that some of the maladaptive students with low ability in academic have low mastery and performance goals approach and avoidance. They also found that these students were not interested in learning or doing better than others. The maladaptive behaviour such as lazy, indicated that the students, are not even concerned about failures, experienced inferior complex or losing skills. This behavior indicated that the low and average academic ability had low motivation, thus will affect their achievement goals.

Thus, it was proven that when mastery goal orientation was implemented, students demonstrated higher levels of learning strategies compared to those who compared their abilities and perception with others (Adesope, Gress & Nesbit, 2008).

However, the goal orientation should be specific, attainable, accepted, have feedback and evaluation on their performance (Lunenburg, 2011). Although goal orientation is recently reported to exhibit anxiety in the performance (Zakaria, Musib & Shariff, 2013), they found that there are many ways to overcome the anxiety in performance. They have identified methods such as seeking help from The Creator specifically through praying, applying more practices, breathing and relaxation and mind setting to perform. These methods were being implemented recently to increase performance based on the goal orientation through the biofeedback technique which will be explained as follows:

2.5 BIOFEEDBACK

Throughout the establishment of biofeedback training, starting from 1971 to 1982, Olson (1987) has categorized biofeedback into 3 major functions describing (1) operational emphasizing the processes or procedure; (2) teleological (objectives of

operational) and (3) combination of both functions (Brown, 1977; Schwartz & Schwartz, 2003).

Firstly, he found that biofeedback is a group of therapeutic procedures involving different sites, modalities and procedures. Feedback in biofeedback is not enough by just looking at one modality. Other procedures include verbal instructions, focused attention, stress challenges, relaxation procedures, feedback and motor skill learning should be considered into account. Secondly, biofeedback can defined as a training utilizing electronic or electromechanical instruments. Electronic modalities including heart rate, EMG, skin temperature, perspiration, blood volume, blood pressure, respiration and electroencephalography. Meanwhile, the electromechanical instruments that can be used are pressure transducers and goniometers. Thirdly, the training is to accurately measure, process, feedback to individuals and their therapists. The patients receive the signals directly and these physiological signals make the patients easily assume a greater and different role. At this stage, sometimes a therapist becomes a coach or instructor (see Figure 2.5).

Fourthly, it is about the information with educational and reinforcing properties. In the learning theory model, fed back is viewed as positive reinforcement of physiological changes. Meanwhile, from the behavior perspectives, biofeedback trains samples to self-regulate their physiology and cognitive learning. The fifth definition is about the involvement of the neuromuscular and visceral activity and innervated by the central or the autonomic nerves system or both and the sixth, is about feedback that may be in the form of analog, or binary, auditory, and/or visual signals.

Besides that, the seventh explanation on the best feed back achieved with a competent professional conducting the therapy or training through a proper cognitive preparation, instructions and guidance. It shows that the professional conducting the therapy is an integral part of intervention. In the eighth, Olson defined biofeedback as an objective to develop awareness, confidence and increase voluntary control over physiological processes. Meanwhile the ninth describes that biofeedback is by first controlling the external signals. It brings out an overview that firstly, a person learns to

control over the external signal and slowly develops more control on the physiological processes.

Finally, biofeedback is a training using cognitions, sensations or other cues to prevent, stop or reduce symptoms. It indicates that the goal of the training is to develop and maintain physiological self-regulated person without feedback from the external instruments in their daily lives.

At the early stage of biofeedback training, it was widely implemented in health conditions (Lehrer, Vaschillo & Vaschillo, 2000; Gatchel et al., 2003; and Schroeder et al., 2004). Some of the researchers examined the HRV and baroreflex biofeedback to investigate the physiological parameters and the clinical outcomes between healthy samples and disease infected (Wheat & Larkin, 2010; and Von Borell et al., 2007). It was reported that the treatment is effective to overcome the attention deficit and hyperactivity disorders (ADHD) (Huang-Storms et al., 2007.

Recently, training in biofeedback is tremendously developed and spread in various kinds of fields to increase the performance psychology of basketball player (Paul & Garg, 2012), to improve the cognitive performance among manufacturing workers (Sutarto, 2012; Sutarto, Wahab & Zin, 2010) and to overcome competitive anxiety and anxiety in music performance (Lagos et al., 2008).

This technique is a training to perform a particular response after receiving a feedback on a quantitative response. The person who underwent the training protocol will adjust their skill or behavior to control internal physiological responses (Von Borell et al., 2007). Or in other way, the biofeedback training is a method to alter any physiological activity to enhance the psychology and performance among individuals who underwent the training session (Babiloni, et al., 2008). These physiology responses viewed the function of the autonomic nervous system which demonstrates the balance of sympathetic and parasympathetic (known as vagal activity).

Thus, it is a tool to develop the ability of a person to change a particular physiological response that was given to them, the feedback that they attempted to alter

or control (Gatchel et al., 2003). By attaining feedback from their physiology arousal, they are taught to control their cognitive, emotion and physical states during the training (Wilson et al., 2006). Their psychophysiology response depended on their different implementation in awareness, breathing, cognitive and emotional patterns during the training (Peper et al., 2013). This indicates that the mind-body connection was affected by emotion and thought, thus, produces the results quantitatively. From the results obtained, a person was trained to improve his/her physiology responses by altering the psychology states such as thoughts and emotions.

Learning to control the mind-body connection is based on the psychophysiology principles stated by Green, Green and Walters (1970). They figured out that every changes in physiology has relationship with mental emotion states. Thus, this awareness of emotion, behavior and thought is one of the method training in biofeedback being used previously and at present (Paul & Garg, 2012; Peper et al., 2013).

Peper et al., (2013) in their research on self-care using biofeedback training and somatic feedback, have proposed a goal to change the cardiac patient's focus from dysfunctional behaviors or thoughts to better health thoughts. They observed on how the patients' thoughts, emotions, and behaviors affected their body and health. Their target is to make the patients become more willing to learn strategies to change cognitions, emotional responses, and behaviors. They found that this mind-body connection has influenced each other positively. Their findings revealed that the biofeedback training could facilitate people in changing illness beliefs, cognitive, emotional and behavioral pattern.

To achieve the mind-body connection, the biofeedback training or protocols should reach between 1 to 50 sessions depending on the improvement and adaptation in developing new skills (Burgio, Whitehead, Engel, 1985; Burgio et al., 1998). A proper and modulated biofeedback training is needed to develop awareness, mastering the skills (Peper, Harvey & Takabayashi, 2009). Thus, the main goal of a biofeedback training is to monitor physiological responses and then utilizing the information to practice and achieve self-regulation.

During the biofeedback training, each person learns to monitor their psychophysiology states from the physiology signals that appeared on the monitor. This psychophysiology states is the science of studying the causal and interactive processes of physiology, behavior and subjective experience (Olson & Maio, 2003). The feedback will develop and increase self-awareness and self-regulation in monitoring their physiology by controlling their thoughts, movements, emotions and reactions (Peper et al., 2009, 2013).

The feedback from the biofeedback training will detect the sympathetic and parasympathetic nerves system through heart rate variability (HRV). In order to reach the balance between two branches of nerves, a coach will guide the sample/patient to increase the HRV score. Thus, the sample was being encouraged to relax the body and mind, try to avoid any anxiety and negative emotion states and implement a diaphragmatic breathing technique to get a smooth sinusoidal wave forms (RSA). Through biofeedback HRV, reinforcement on the diaphragm breathing which involved six breaths per minute could be done (Moss & Shaffer, 2003).

In 1965, David Shapiro offered the first academic course in psychophysiology at Harvard University explaining the scientific study of the interrelationships between physiological and cognitive processes. It can be concluded that human psychology could be facilitated, managed, guided, hindered or obstructed to observe the effects on physiology. Thus, in the clinical experimental biofeedback training, a person could alter their behavior based on the feedback from the physiology including peripheral blood flow, muscle activity, cardiac activity, sweat gland activity, brain electrical activity and blood pressure (Schwartz & Schwartz, 2003).

Basically, a biofeedback training utilizes an electronic sensor to monitor and measure physiological signals and activities such as brainwaves, heart functions, breathing, muscle activities or skin temperature. These instruments provide feedback details to the user instantly and accurately (Wilson, Peper & Schmid, 2006). The sensor being used will be filtered and processed, quantified, visualized and audited as a feedback as shown in Figure 2.5 (Peper, Harvey & Takabayashi, 2009). The feedback is computerized by providing results in the forms of graphs, figures, images and sound.

The feedback details appear immediately and in real-time feedback directly after the training begins.

The changes of feedback appear in numbers and graphs that are immediately shown on the screen. This information brought a belief to the samples whose thoughts and emotions will influence their body responses. The numerical and graphical data in the feedback indicating their level of physiology responses related to emotion and cognitive states (Wheat & Larkin, 2010; Paul & Garg, 2012). Finally, the feedback and information from the database could be used to develop, reinforce, increase and enhance their awareness in self-regulation behavior (Peper, Harvey & Takabayashi, 2009).

Figure 2.5 shows the flow diagram of the biofeedback equipment in explaining the process of biofeedback training to alter psychological states by investigating the feedback from physiology condition. From Figure 2.5, the signal is recorded from the person, amplified, processed, stored for later retrieval and analysis, and transformed into a signal that is fed back to the participant. In certain situation, the therapist/coach/trainer can be the mediator for the feedback signal. The response from the sample will be collected, analyzed, and correlated to the recorded physiological signals.

In order to explain the relationship between self-regulation and biofeedback, there are two mechanisms involved to build up the performance enhancement. The first mechanism is the self-awareness and metacognitive processes (self-monitoring, observation and targeted task or goal) (Tanis, 2008). By monitoring the changes in their psychophysiology states (heart rate variability, skin conductance, etc.) via biofeedback equipment, a person could increase their performance. The given task or goal in the biofeedback training could also determine their cognitive-affective response such as stress or anxiety reduction.

Meanwhile the second mechanism is the motivational and emotional paradigm which influenced the intrinsic and extrinsic motives of a person. The successful of the self-regulation during the training is depending on the communication of the heart and brain through emotion (Mccraty, 2005; Mccraty et al., 2009). There are several ways to achieve the balance in the psychophysiology states such as respiratory and emotional

control. Thus, the self-regulation among samples during the biofeedback training could make changes in their achievement by developing certain goal in their mind-setting.

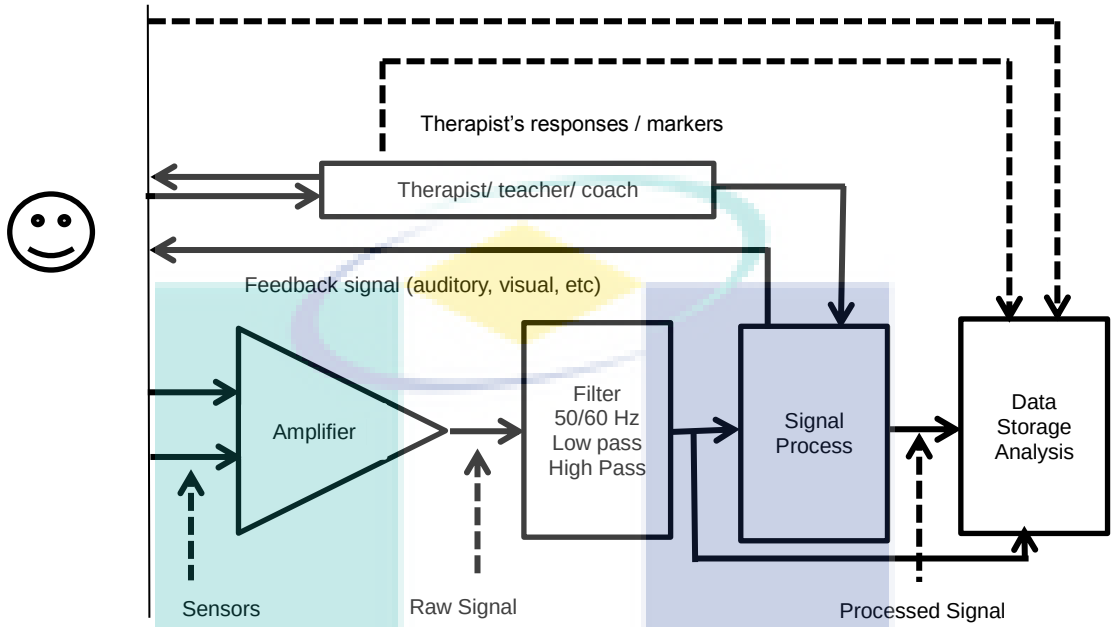

Figure 2.5: Flow diagram of biofeedback equipment

Source: Peper, Harvey and Takabayashi (2009)

To measure their self-regulation during the biofeedback training, the researcher will encourage the students to get the highest score in the HRV coherence score as follows:

2.6 HEART RATE VARIABILITY (HRV) AND AUTONOMIC NERVES SYSTEM (ANS)

2.6.1 Heart Rate Variability (HRV)

HRV refers to the variations of consecutive heart rate by investigating the beat to beat intervals in the cardiac cycle's duration (Task Force, 1996a; Mccraty, Atkinson & Tamasino, 2001; Schafer & Vagedes, 2012). It means that HRV is the measurement of variations of the successive heart beats which explain the circulatory functions in

analyzing the autonomic nerves system significantly (German-Sallo, 2014). The variability of consecutive beat to beat intervals is determined by analyzing the time series using the digital processing of an electrocardiographic or electrocardiogram (ECG) signal. The signal is automatically detected by computer algorithms to measure the cardiac cycles. Finally, the measurement of regular beats will obtain an accurate data through a time series of consecutive RR intervals (Schafer & Vagedes, 2012).

In depth, the changes in the beat to beat interval will respond to the cardiovascular control system. This cardiac cycle's variation will influence the arterial and venous blood pressures continuously that is associated with respiration. Thus, through baroreceptors and chemoreceptors, the autonomic nerves system (ANS) maintain the cardiovascular homeostasis (maintain a state of equilibrium) by responding the beat to beat pertubations (Papaioannou, 2007).

It is also a measurement of cardiac activity which reflects the autonomic nerves system and sinoatrial node. The sinoatrial node activity involved respiration. Through the decrement in inspiration and expiration in the respiration process, the cardiac vagal responses enhance the baroflex activation on the heart rate (Papaioannou, 2007).

In other interpretation, it is a non-invasive and quantitative technique to assess the equilibrium between sympathetic and parasympathetic (vagal activity) in the autonomic nerves system. This natural pattern of changes in heart rate will rise and fall during the inhalation and exhalation processes, indicating healthy and functional response. This fluctuations response is influenced by either arousal or decrement in emotions and behavioral changes (Schwartz & Schwartz, 2003). It is also known as cycle length variability, heart period variability, RR variability, and RR interval tachogram (Task Force, 1996b).

HRV represents an assessment of autonomic nerves system functioning that can be measured quantitatively and the most reliable technique in the domain of psychophysiological states (Sutarto, Wahab & Zin, 2010). It means that HRV is an analysis of the interaction between the activities in the SNS and PNS by modulation of the heart beat to beat interval (Zengyong et al., 2003).

From the other point of view, HRV is an indicator to self-regulatory towards strength and efforts that drive persistence in doing difficult tasks, control desires and emotions as well as self-regulatory fatigue (Bradley et al., 2010).

By investigating the spectral analysis of the HRV, a person could detect the response in the autonomic nerves system (Campbell et al., 2006) which indicates the balance between sympathetic and parasympathetic (vagal) activity in the heart rate (Akselrod et al., 1981; and Task Force, 1996a). If a person is in an anger state, it will increase sympathetic activity and reduce parasympathetic (McCraty, Atkinson & Tamasino, 2001). It is reported that higher HRV seems to indicate an optimal cooperation between the sympathetic and parasympathetic nervous system.

Spalding et al. (2004), in the training session asked the athletes to increase physical fitness. This exercise training induced a vagal mediated parasympathetic effect that slowed the heart rate and enhanced the emotional control needed in the competition. They figured out that during the competitive stress, the parasympathetic nerves system increased weakly. In other study, it has been demonstrated that positive emotional states associated in competition and performance will increase the sympathetic activation which finally build up confidence (McCraty, 1995).

On of the measurement of HRV, the frequency domain measurement is being used (Task Force, 1996a). The Fourier transform approach analyzed the spectral analysis that can be described as the frequencies band or ranges of the power spectrum. This approach consists of a very low frequency (VLF) ranging of 0.0033 to 0.04 Hz, the low frequency (LF) range is around 0.04 and 0.15Hz and the high frequency (HF) range is between 0.15 to 0.4 Hz. The spectral analysis of the tachnogram transform the signals in the time domain measurement into signal in the sine and cosine wave frequencies with various frequencies and amplitudes. (Mccraty, Atkinson & Tamasino, 2001; Bailón et al., 2001; Felix et al., 2010). These frequencies components are also known as coherence where a single waveform is formed from an ordered pattern. (Mccraty, Atkinson & Tamasino, 2001).

According to the previous study, the highest amplitude of the heart rate variation can be obtained through breathing at 6 breaths per minute at the resonant frequency of 0.1 Hz (Hassett et al., 2007). Breathing at this resonant frequency will affect the respiration sinus arrythmia (RSA) which is controllable by the parasympathetic nervous system (Lagos et al., 2008).

Previous studies have demonstrated that LF and HF components describe the ANS's sympathetic or parasympathetic branches. Meanwhile, the VLF range, describe slower changes in heart rate and is the indicator of sympathetic activity. The VLF is attributed to thermoregulatory processes, peripheral vasomotor activity and the renin-angi-tenin system (Lehrer et al., 2000).

Besides that, the LF power spectrum range is affected by the oscillatory rhythm of the baroreceptor system that relects the blood pressure signals sent from the heart to the brain which influenced the HRV waveform (Lehrer et al., 2000). The LF power spectrum is the combination of sympathetic and parasympathetic nervous system (Mccraty, Atkinson & Tamasino, 2001). Whereas, the HF power spectrum is mediated by changing levels of parasympathetic nervous system that influenced by the respiratory sinus arrhythmia (RSA) as the primary rhythmic stimulus (Bailon et al., 2010).

The increment in the LF coherence score was related to a sympathetic cardiac control, a decrease in parasympathetic control, or both. The related emotion associated with the increment of LF was stress, which the power score of LF, with 0.1 Hz of heart rate variability. This low frequency oscillations will increase the renin-angiotensin system's activity (Clermont & Andus, 2001).

Meanwhile, during stress, the high frequency (HF, 0.12 or 0.15–0.4 Hz) power decreased (Berntson & Cacioppo, 2000). However, the increment in in the HF may be affected by the mild stress, some response to an attentional and cognitive task (Quigley & Berntson, 1990).

By using the frequency domain measurement, the process of data recording can be calculated in the short term investigation between 2 to 5 minutes (Schroeder et al.,

2004; Sayers, 1973; Task Force, 1996b). This range of short term power spectrum analysis should record at least 10 times wave-length of the lower frequency bound. Thus, to assess LF power spectrum, at least one minute recording is needed, while to achieve the HF power spectrum, 2 minutes of recording is enough. However, 5 minutes recording is preferred to assess a rhythmic pattern. However, the duration could be less than 5 minutes, depending on the purpose of the study during the biofeedback procedures (Akselrod et al., 1981; Pomeranz et al., 1985; Papaioannou, 2007).

This short and ultra short term data recording's duration is limited to the healthy samples or patients (Mirza et al., 1994; Dekker et al., 1996). By implementing a repeating HRV measurement, starting from 10 second, 2 minute and 6 minutes procedures, the therapist or coach could optimize the HRV measures. This short term repeatability has been implemented among 63 healthy middle aged men and women in their study on repeatability of HRV measures (Schroeder et al., 2004). Schafer & Vagedes (2012) found that short term recordings are useful and have diagnostic value.

The frequency domains obtained from the power spectrum of the RR interval are reported to reflect to cardiovascular control and autonomic health. Through HRV Biofeedback, anxious students have been detected psychophysiologically. R-R Interval analysis indicates that HRV is the indicator to the autonomic nervous system response. Recently, before undergoing the biofeedback training, the HRV analysis demonstrated that anxious students experienced extreme anxiety, fear, severe emotion responses and have negative thoughts (Prima et al., 2010). After undergoing the training, it was shown that the HRV analysis could detect emotion. It was because any changes in behavioral states, in terms of thinking, breathing and emotions will increase the heart's rhythm (Lagos et al., 2008).

Earlier, students who have been practicing HRV techniques and emotional management are able to improve their emotional stability, behaviors in classrooms and academic achievements (Arguelles, Mccraty & Rees, 2003). These findings indicated that this technique is capable in reducing unpleasant behaviors and thoughts. It could also develop and encourage emotional stability, mental acuity and physiological effectiveness.

Recently, investigations on performance and achievement using the HRV measurement as an indicator of psychophysiology states have been proven quantitatively. Paul & Garg (2012) investigated the effects of HRV while coping with pressure and anxiety in sports performance. They examined the effectiveness of biofeedback protocol based on the stress eliciting situation. They were 30 basketball players who were divided into three groups which were biofeedback experimental group, Placebo group and Control group (no treatment). The biofeedback group received training on breathing at resonant frequency pace stimulus for 20 minutes, while the placebo group was shown a motivational video clips for 10 minutes and the control group was not given any intervention. By using the Two way ANOVA measurement, the analysis yielded a significant relationship between interaction of group and time (p=0.0001) and inter group difference (p=0.05). The result on the HRV biofeedback showed that the anxiety states become lower and described positive relationship between Heart Rate Variability biofeedback and performance.

Thus, the explanation on the autonomic nerves system, from the physiology perspectives which related to the HRV analysis is as follows:

2.6.2 Autonomic Nerves System (ANS)

The autonomic nervous system (ANS) is an involuntary division of the nervous system that consists of motor neurons (autonomic neurons) that conduct impulses from the brain stem or spinal cord to cardiac muscle, smooth muscle and glands. These motor neurons are responsible for regulating heart rate, peristalsis (smooth muscle contraction of the digestive organs), and the release of secretions from certain glands as shown in the Figure 2.6. In other words, it is responsible for regulating involuntary body functions, such as heartbeat, blood flow, breathing and digestion. The Autonomic Nerves System consists of sympathetic and parasympathetic division (Schlindwein et al., 2008).

This Autonomic Nerves System comes from the division of the peripheral nervous system (PNS). PNS is the division of the nerves system containing all the nerves outside of the central nervous system (CNS). It is responsible to connect the

CNS to the organs, limbs and skin. These nerves extend from the central nervous system to the outermost areas of the body (Source: http://psychology.about.com/od/aindex/g/autonomic-nervous-system.htm (10 June 2013).

The sympathetic system regulates the fear, flight or fight responses. This nervous system performs tasks such as relaxing the bladder, speeding up heart rate and dilating eye pupils. While the parasympathetic system helps maintain normal body functions and protect the physical resources. This division helps slow the body reaction to allow less urgent processes such as controlling the bladder, slowing down heart rate and constricting eye pupils.

According to previous study, different emotion and cognitive states produced different physiological results. Any changes in emotions states will affect the brain and body. The negatives emotion such as feeling anxious or frustrated will make the heart rhythm become less coherent and erratic. It will increase the sympathetic activity and reduce the vagal activity. This indicated the desynchronization between sympathetic and parasympathetic in the Autonomic Nerves System. Meanwhile, the positive emotion and cognitive states will increase the heart rhythm and other biological oscillatory body system that will generate coherent signal (Mccraty, Atkinson & Tamasino, 2001; Kreibig, 2010).

It was reported that the balance between the mind and emotion will increase the coherence into ordered and harmonious function. The communication between the cognitive and emotional systems makes the neural connection in the brain, directing the emotional states into cognitive reactions. Thus, it shows the power of emotion in the mind-body connection. (Mccraty, Atkinson & Tamasino, 2001).

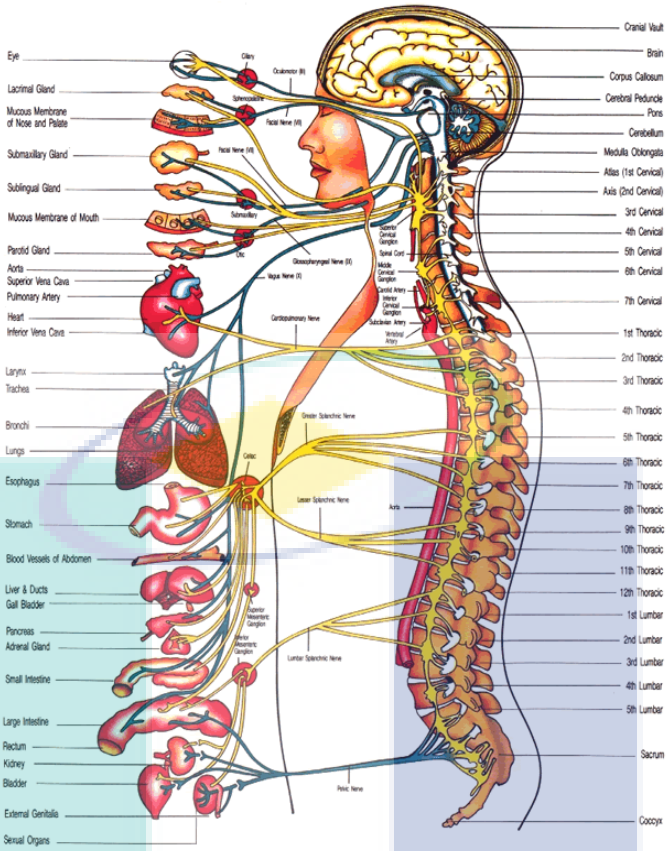

Figure 2.6: Autonomic Nerves System of Human Physiology

Source: http://www.demosschiropractic.com/images/autonomic-nervous-system.gif (10 April 2013)

The autonomic nerves system also controls the body response to the external and internal stimuli, in order to attain stability in physiology. HRV strongly functions to the autonomic control mechanisms. It was reported that the pattern of the heart's rhythm which is affected by the emotional state (Mccraty et al., 2009) indicated the imbalance in parasympathetic and sympathetic nerves system (McCraty et al., 1995).

The psychology states in terms of emotion has important role that gives signals to the heart (McCraty et al.; Thayer et al. 2010). Therefore, HRV plays a role in encoding the heart–brain interactions and autonomic nervous system dynamics (McCraty et al. 2009, 2006; Bradley et al., 2007). By indexing the self-regulatory strength and effort such as trying hard in a difficult task, regulate emotion and also the negative emotion states, HRV showed a positive response towards cognitive

performance (Bradley et al., 2007). These research deduced that the communication between brain and heart or the mind-body connection could detect any changes in the behavior, cognitive or other stimuli. From there, the heart transmit the neurological pattern, hormonal, pressure and electromagnetic information to the brain and body (Mccraty, 2001).

Thus, laziness could be measured because any responses of emotion, fight or flight were located in the Central Nerves System (CNS) of the brain, which is related to the Autonomic Nerves System. This Autonomic Nerves System over the cerebral cortex could be controlled through the biofeedback technique. In depth, the amygdala in the cerebral cortex associated with deep emotion and fears. Meanwhile, the hippocampus is crucial for memory storage and emotions. Therefore, this mind-body connection can be measured, quantified and observed on a computer display by investigating the frequency domain in the beat to beat interval (Demos, 2005).

Thus, to change the physiology condition, a person should learn on how to control their mind and emotion. This pcychophysiogical changes affecting each other directly according to research done by Green et al in 1997 (Peper, Harvey & Takabayashi, 2009). Learning to change the physiology or vice versa could be achieved through biofeedback training. The explanation to the biofeedback training will be discussed further as follows:

2.7 PROCEDURES OF BIOFEEDBACK SELF-REGULATION TESTING SCRIPT

Biofeedback procedures and protocols that were being implemented in the study, consists of diaphragmatic breathing technique, self-regulation stimulation script and zikr (rememberance of *Allah*, The Exalted). Based on previous studies, there was a significant use in implementing those protocols to measure behavioral and emotional changes.

2.7.1 Diaphragmatic Breathing

The diaphragmatic breathing technique is breathing with six breaths per minute with a return of respiratory of sinus arrthmmatia, improves cardio-respiratory synchrony and helps to calm the mind (Kajander & Peper, 1998; Bernardi et al, 2001). These six breaths per minute produce the LF range of the heart rate variability at around 0.1 Hz. The LF range is known to have association with the sympathetic nerves system (Whited, Larkin &Whited, 2014).

This diaphragmatic breathing technique demonstrated a slow and rhythmic inhalations and exhalations in muscles movement. The diaphragm muscles move downwards while inhalation and upwards in exhalation. The movement of diaphragm muscles is different from the normal breathing pattern in adults, which involved the respiration rate of 15 to 22 breathing pattern per minute using shallow thoracic movements (chest breathing) (Peper & Tibbitts, 2003).

Generally, respiration involved the processes of ventilation, perfusion and diffusion in the gas exchange. The oxygen in the arterial blood will go to the body tissues and eliminate the carbon dioxide (Patel & Catherine, 2008). Through the ventilation process, the air moves in and out of the right and left lungs. The air movement is determined by the respiratory rate which is number of breaths per minute and the volume of each breath. A change in ventilation can be brought by altering the number of breaths per minute and adjusting the amount of air in the lungs with each breath. Meanwhile, in the perfusion process, blood is delivered to the lungs from the right heart. The diaphragm is the main muscles of respiration that has right and left domes as shown in Figure 2.7 (Patel & Catherine, 2008). Thus, in order to assess the low frequency range of heart rate in the the respiration processes, a person should apply the diaphragm breathing technique which demonstrates a slow and rhythmic breathing (Song & Lehrer, 2003).

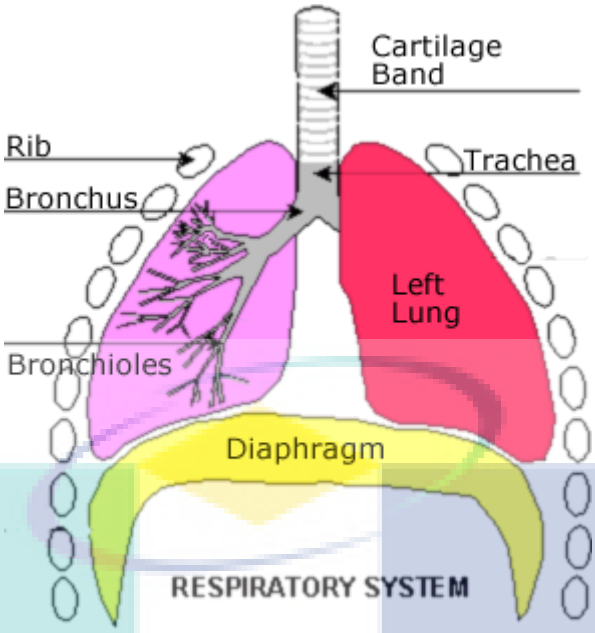

Figure 2.7: Diaphragm Breathing

Source: *http://www.swamij.com/diaphragmatic-breathing.htm (*3 June 2013)

Diaphragmatic breathing technique as the component of biofeedback training has significantly showed the decrement in the psychophysiology symptoms. It has been used to prevent physical and psychophysiology disorder among children and become an intervention in the biofeedback training (Peper, 1998). Some research has been using this technique to overcome the psychophysiology tension, arousal and disorder such as anxiety, poor concentration, dizziness, unharmonious heart rate, asthma, stress, attention deficit disorder and negative affect (Culbert, Martin & Mccraty, 2013; Peper & Tibbitts, 2003).

Diaphragmatic breathing technique involved the movement of stomach when a person inhale. This kind of breathing technique does not involved any movement of shoulder or chest. During inhalation, the diaphragm muscle contracts, and pulls downward. The ribs flare out slightly, and pull the bottom of the lungs downward to bring in air. With proper diaphragmatic breathing, there is no movement in the upper thoracic cage (chest) as shown Figure 2.8.

While, during exhalation, the diaphragm releases and the air goes out with lower thoracic cage (chest) comes inward from the sides and front. Both upper chest and abdomen remain still. There is no pause between breaths and a smooth breathing comes out and positively relaxing the autonomic nervous system and mind (Peper et. al., 2013).

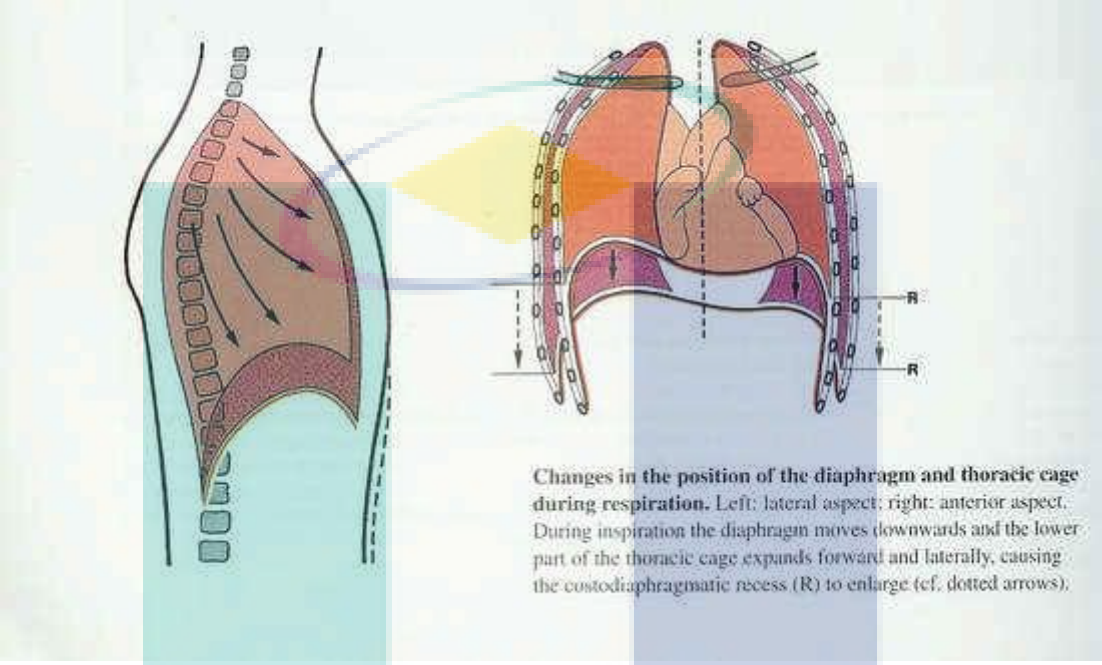

Figure 2.8: Inhalation and Exhalation Breathing Process

Source: *http://www.swamij.com/diaphragmatic-breathing.htm (*3 June 2013)

2.7.2 Self-Regulation Stimulation Script (Communication)

In general, communication can be defined as the transmission of information or certain meanings to the mass public (Robbins, 2001). It is a sharing of an information between two or more individuals, in order to achieve a consensus towards reaching an effective decision (Devito, 2007). Communication also is a process of transmitting and and receiving message involving the process of speaking and the ability of listening (Cunningham, 1995). Therefore, communication carries the meaning of transferring information, feelings, ideas and one's thoughts to other individual or group of people.

Communication can be divided into two kinds of methods which are verbal and non verbal communication. Verbal communication is an interpersonal and intrapersonal communication (Devito, 2007). It is reported that the factors leading to success and failure are intrapersonal and interpersonal communication - teacher, teaching method, teenager's influence, institution, society and student's disciplinary level. Regression analysis indicated that there is a positive relationship between intrapersonal and interpersonal communication and student's motivation (Joinson, 2007).

The interpersonal communication involved an exchange of information and thoughts among two or more individuals. According to the conclusion by Brooks and Health, an interpersonal communication is a process by which information, meanings and feelings are shared by persons through the exchange of verbal and non-verbal messages (Owen, 2004).

Meanwhile, the intrapersonal communication is an exchange of message and information transformation within one's self. Some researchers defined intrapersonal communication as self-talk, inner dialogue, reasoning or the processing of information (Robbins, 2001). Meanwhile, others interpreted it as related to inner psychological processing in terms of cognitive, perceptual and motivational (Johnson, McGrath & Mcneil, 2002; Diamond, Siqueland & Diamond, 2003). Thus, in order to motivate a person, self talk is one of the methods in psychology to attain the desired goal and finally, affect behavior (Ramsay & Lewis, 2003). Many athletes used the self talk method to increase motivation (Hardy et al., 2001).

By using short phrases and neutral self-talk, it has positive impact on the motivational arousal and cognitive skills (Gammage et al., 2001). If it is implemented effectively, self talk could become a cognitive strategy in enhancing the motor tasks and performance (Hardy et.al, 2001; Kolovelonis et al., 2010). As an internal dialogue within a person in interpreting feelings and perceptions to regulate or change the evaluations, self talk gives some instruction that influence the way of thinking, thus driven to an action (Hackfort & Schwenkmezger, 1993; Gammage et al., 2001). As reported in the early findings, self talk is about thinking of something (Bunker, Williams

& Zinsser, 1993), feelings (Watts, 1996) and self-persuasion to generate changes in the belief and behavior (Smith, 1982).

In order to perform well, individuals must recognize one's emotions (Zizzi, Deaner & Hirschhorn, 2003) and apply psychological skills such as self-talk and imagery that have positive relationship with emotional intelligence (Laborde, Brull, Weber & Sophie, 2011).

As an internal dialogue within one's self, with consciousness and not (O'Sullivan et al., 1983), intrapersonal communication transfers the messages between one's brain and the other body parts (Whetmore, 1985). Thus, any stimuli or persuasion from external conversation could give impact to behaviors, thoughts, emotions, motivations and perceptions (Peper et al, 2013; Gammage et al., 2001; Wilson, Peper & Schmid, 2006).

According to the previous study, words may cause either positive or negative outcomes towards illness beliefs among patients. Peper et al. (2013) in their research to investigate the relationship between words and the effect on clinical outcomes, found that words have huge influences on illness belief and finally will affect behavior. From one of the cases referred to Rafał Sztembis (one of the researcher, is a patient who underwent a treatment on the cardiovascular disease by the insertion of a metal scaffold in an area of the artery where the atheromatous plaque had ruptured, in order to sustain blood flow in the coronary artery. Before the treatment, he was an active businessman. On the day of discharge, he received some information stated that his ejection fraction is 60%. Without asking for further information, he went back home. Two years later, he was referred to Sztembis. Although already cured, he was completely down and looked stressful. After some discussion, starting from the day he was discharged, he really thought that he had only 60% of his abilities in physiology, social and other activities. He felt unable of being active anymore. Whereas, the 60% of ejection fraction means normal and for a patient after myocardial infarction, it is an excellent result. Sztembis then explained that the 60% meant that his heart is totally recovered. After the discussion, his illness belief changed and within one week, he had got back the self-confidence and was motivated. This indicates that communication is the important

element in changing other perception, cognitive, emotion, behavioral pattern and belief (Mcneil, 1995; Joinson, 2007; Gammage et al., 2001; Hardy et al., 2008). This approach showed that the mind-body connection is related to each other (Peper, Gibney & Wilson, 2004).

As a summary, through the process of persuasion during the intrapersonal communication, information processing takes place. It means that if someone motivates other individuals with the intention to transform one's perception, behaviours & emotions, the intrapersonal communication occurs inside the individual who received the stimulation. As a result, this will affect cognitive development, emotions & behaviours. If the external motivation manage to influence someone, self talk would be initiated & improves the individual's performance and achievement, and vice versa.

2.7.3 Zikr (Remembrance of God-*Allah*, The Exalted)

Zikr is the remembrance of Allah, The Exalted, which is stated in the Al-Quran, Al-Ahzab 33:41, "*O ye who believe! Remember* Allah *with much remembrance.*" It is a ritual prayer by Muslim that was taught by Prophet Muhammad PBUH in worshiping the Creator, Allah SWT. Zikr also carries the meaning of reminding oneself by remembering God, Allah SWT by repetition of His names frequently (Source: *http://global.britannica.com/EBchecked/topic/160785/dhikr* (20 June 2014).

According to Imam Al Ghazali, a Muslim scholar, our heart has two doors which are opened to the material world and The Hereafter. He said that by reciting the zikr abundantly by tongue and heart, it will erase sins and opens the door to The Hereafter. The best practices in reciting zikr is by engraving it in our hearts with its meanings continuously (Source: *http://www.iqra.net/articles/Ihya/9.php* (20 June 2014).

In order to remember Allah SWT, there are many kinds of phrases usually practiced by Muslims according to what being taught by the Prophet Muhammad PBUH. The main zikr that are usually practiced are *Allahu Akbar* (Allah is the Greatest), *Subhan'Allah* (Glory be to Allah), *Alhamdulillah* (All praise is due to Allah) and *La ilaha ilallah* (There is no God but Allah).

From the various kinds of phrases, the *La ilaha ilallah* is the best and effective zikr. The Prophet's said in Tirmidhi and Ibn Majah from Ibn Jubayr: "*The best zikr is La ilaha illallah*." This has been proven in the research done by Senik and Wahab (2013) which indicated that the zikr of *La ilaha illallah* has increased the heart rate variability (HRV) that implies the balance in the autonomic nerves system.

The purpose of reciting zikr is to develop a spiritual and close relationship between human and the Creator (Zamhari, 2010). In the Al-Qur'an, Ar-Ra'd 13: 28, clearly stated there, "*Those who believe, and whose hearts find satisfaction in the remembrance of Allah: for without doubt in the remembrance of Allah do hearts find satisfaction.*" Morever, by reciting zikr, our heart and soul will be purified and awakes the human conscience as stated in the Al-Qur'an, Al-Ankabut **29**:45, "*And establish regular prayer, for prayer restrains from shameful and unjust deeds, and remembrance of Allah is the greatest thing in life, without doubt*." Therefore, to get satisfaction in life and a peaceful soul, reciting the zikr is the best mechanism.

Moreover, zikr is seen as one of the tested and effective method in increasing performance. It is a system of practice to increase the activity of cellular groups in the brain parallel to the meanings of words given in the list. Investigators from Washington University have used PET (Positron Emission Tomography) scan to measures neural activity indirectly by tracking changes in blood flow in subjects injected with a short-lived radioactive tracer.

Research done by John Horgan concluded that when a person reads a new learned noun or repeats a given word, different regions and dormant neural groups of the brain engages and becomes active. As a result, the working capacity of the brain is increased where several distinct parts of the brain, including parts of the prefrontal and cingulated cortex, display increased neural activity. After repeating the same task several times, the activity shifted to different regions. When the volunteers were given a fresh list of nouns, the neural activity increased and shifted back to the first areas again (1993). It showed a connection between brain and the sympathetic nerves system. This indicates that the repetition of words has impact on physiology, especially on human's

brain and autonomic nerves system. The shifted brain regions means that the arousal or activation of the sympathehic nerves system (Schlindwein et al., 2008). The arousal in the sympathetics nerves system is reported to be related with emotion such as becoming calm (Thayer, 2005).

According to the Al-Qur'an, Al-Ra'd 13:28, "*Those are the people who have believed and whose hearts rest in remembrance of Allah. Verily in the remembrance of Allah do hearts find rest."* The rest states here carries the meaning of lowering the levels of stress, anxiety and depression. Previous studies also showed that the physical attachment to the church and performing ritual activities make the performers become calmer and happier that will slow down the breathing to six breaths per minutes (Bernardi et al., 2001). It was also reported that individualss who recite zikr could achieve HF HRV with 0.1 Hz (Sutarto, 2012) which indicates stability in emotion. Thus, the stability in emotion increases the achievement goal orientation (Cumming et al, 2008; Wilson et al., 2006; Larson, 2000). These research were agreed and consistent with the recent findings on the effectiveness of reciting zikr (Senik & Wahab, 2013).

Furthermore, the zikr is best recited in low voice or not audible to other people around (Zamhari, 2010). Abu Amsaka, one of the members of a salafi group in Indonesia has quoted a few statements from Ibn Kathir (1301-1373) in *Tafsir al-Quran al- 'Azim (The Noble Quran),* Al-Qurtubi in *Al-Jami' Li- Ahkam al-Quran (The Compedium of Legal Rulings of the Quran)* and Jalal al-Din al-Mahalli and Jalal al – Din in *Tafsir al-Jalalain (Tafsir of the Twins Jalal)* stated that zikr should be recited discretely and with humility and fear of Allah. Al-Qurtubi stated in his book that based on the Al-Quran, Al A'raf **7**:55, zikr and prayers are best recited within the heart with humility and in private. According to Amsaka as well, Ibnu Abbas stated that zikr should be recited so as to be heard by the one reciting it only. Therefore, the zikr should be recited with fear, humility and low voice (Amsaka, 2003). Allah, Himself also says in the Al-Quran, Al-A'raf **7**:205, "*And do bring your Lord to remembrance in your very soul, with humility and in reverence, without loudness in words, in the mornings and evening, and be not of those who are unheedful*."

Thus, zikr is the remembrance of Allah in the heart with its meaning that will purify the heart and soul for those who recite it continuously with humility and seek for His forgiveness. By reciting the zikr in the heart, it will make the reciter feels closer to the Creator.

As a summary, Chapter 2 explores the literature review on laziness, achievement goal, self-regulation, biofeedback, HRV, Diaphragmatic Breathing and self-regulation stimulation script (communication). Based on the previous study that closely similar to the particular topics, this chapter interpreted laziness from the various fields of study in psychology and physiology.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter utilized a quantitative analysis to observe the relationship between academic performance and HRV coherence score through four types of protocols. It also discussed on the development of the self-regulation script and protocols in the clinical experiments to investigate the levels of self-regulation among samples, in order to measure their laziness. This study has employed a measure of psychophysiological responses which is called HRV. The purpose of this study is to measure the coherence in psychophysiological that is "a state of sustained positive emotion, a high degree of mental and emotional stability, constructive integration of the cognitive and emotional systems and increased synchronization and harmony between cognitive, emotional and physiological systems" (Mccraty, 2001). The experiment was an observation on the relationship between HRV and self-regulation which contributed to the factor of laziness. The research would utilize the power spectrum analysis, the very low frequency (VLF), low frequency (LF) and high frequency (HF) components of HRV as an analysis of the interaction between the activities in the sympathetic and parasympathetic nervous systems by modulation of the heart beat to beat interval (Zenyong, 2003).

The methodology of this study would be utilizing interviews and discussions on self-regulation script, questionnaires and protocols in the clinical-experimental procedures. The clinical research was done to observe the effects of self-regulation script towards achieving the targeted goal. These self-regulation scripts were developed to increase motivation towards goal, and finally to succeed in achieving the targeted

coherence core in the power spectrum. On the other hand, the clinical-experimental research was meant to study the effects of goals towards self-regulation among samples who would be motivated by biofeedback training protocols through Diaphragmatic Breathing technique, the self-regulation script and *zikr*.

3.2 RESEARCH FRAMEWORK

The following is the whole concept in the methodology of Measuring Laziness Using Heart Rate Variability and Self-Regulation. Figure 3.1 is the research framework on the development of the self-regulation script which would be implemented in the biofeedback training during the protocols.

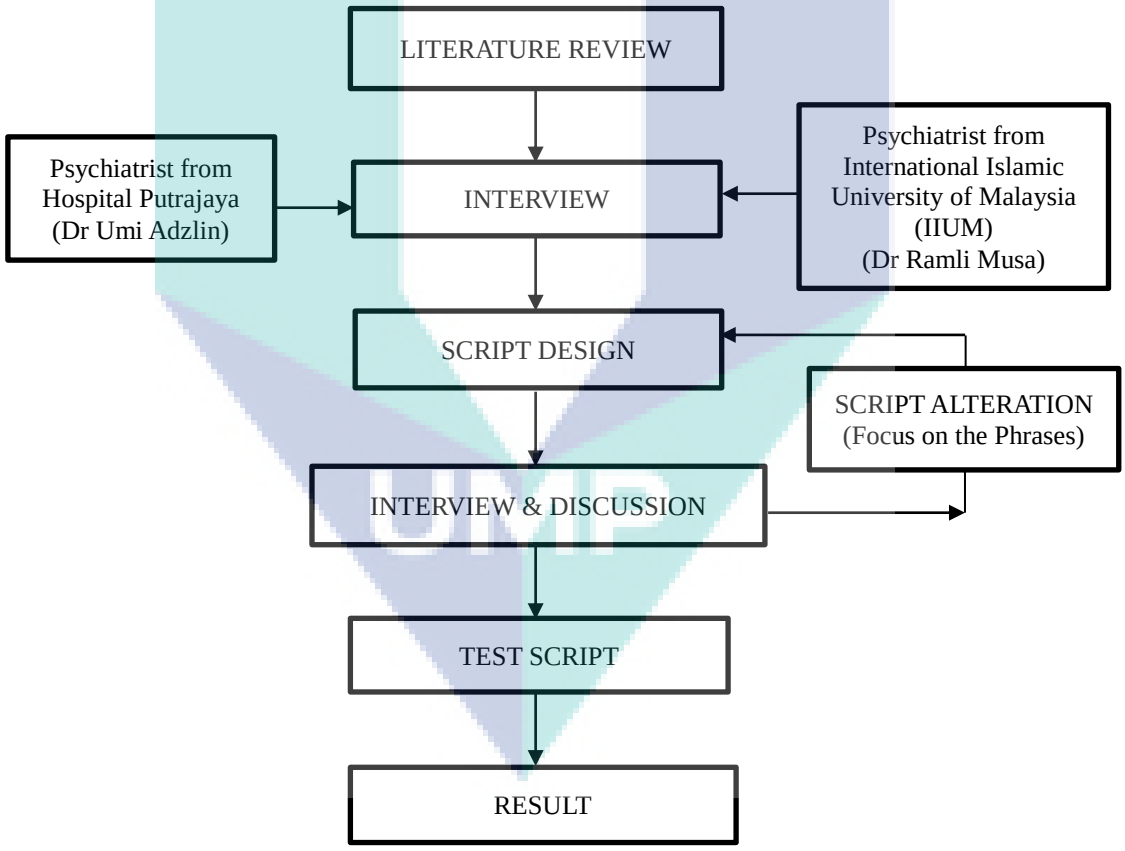

Figure 3.1: Research Framework: Procedures on the Development of Biofeedback Self-Regulation Script Design

Figure 3.2 is research framework of the biofeedback preparation before the samples undergo the protocols. The goal for the training is to achieve 100% LF coherence score during the training. Thus, to increase and maintain the 100% LF coherence score, the samples were being encouraged to apply the diaphragmatic btreathing technique and reciting the zikr of ”*La ilaha illallah*” throughout the protocols.

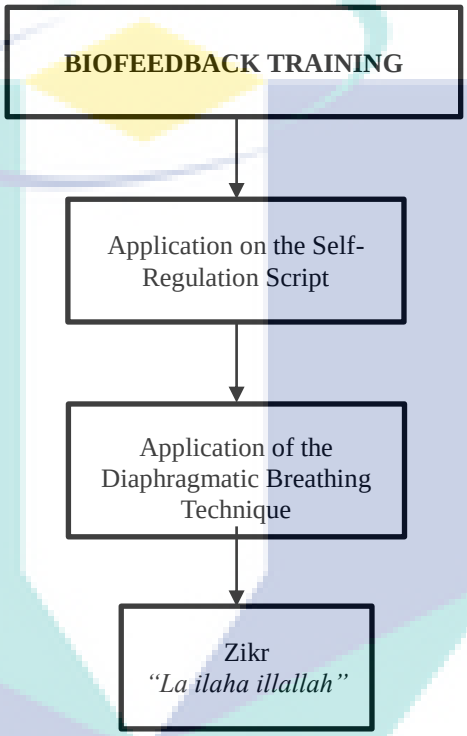

Figure 3.2: Research Framework: Procedures of the Biofeedback Training

Meanwhile, the Figure 3.3 is research framework on the procedures of testing the self-regulation script on different kind of protocols among samples. Before starting the clinical experimental, students were told to fill in the DASS Questionnaire. The Self-Regulation Sript has been tested in the baseline, pre-recorded zikr, self-zikr and self-talk protocols. The obtained scores were being investigated from the HRV Power Spectrum which consists of VLF, LF and HF.

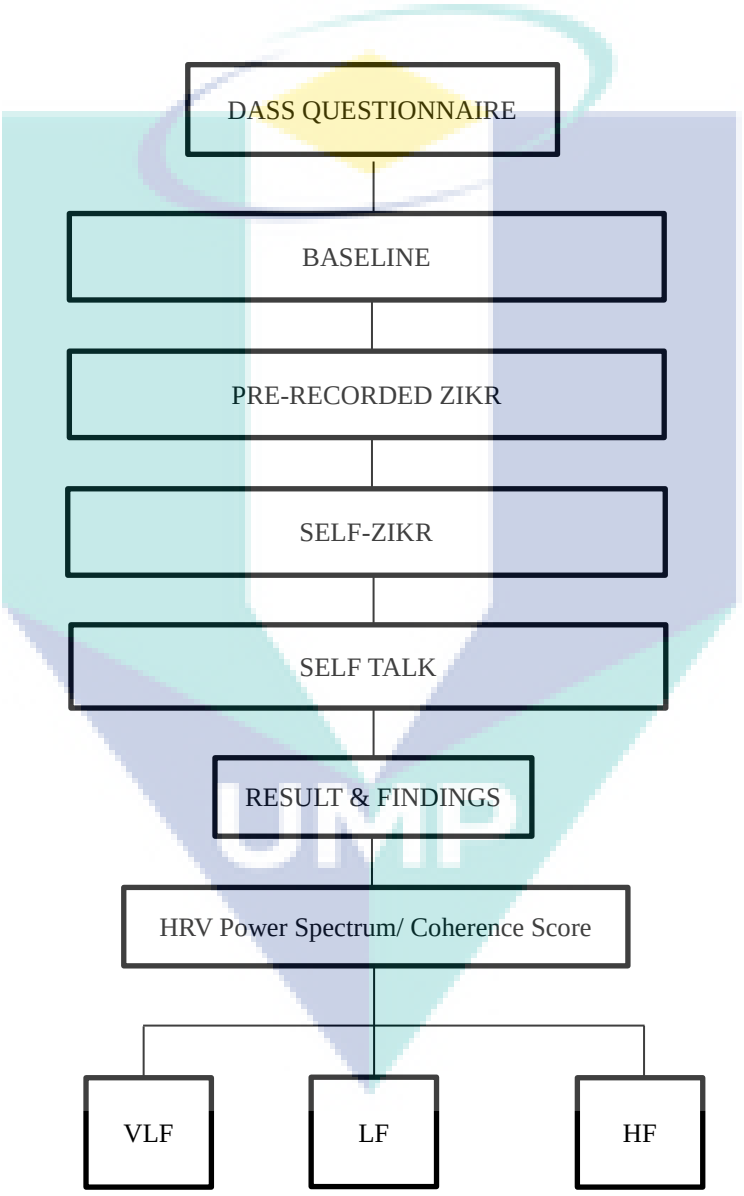

Figure 3.3: Research Framework: Procedures of Testing Self-Regulation Script on Protocols

The following is the research conceptual framework of the analysis in Chapter Three (see Figure 3.4). Sampels of this study consists of different kind of academic performances which were the good and low academic performance. They were being investigated through four protocols which were called baseline, pre-recorded zikr, self-zikr and self-talk.

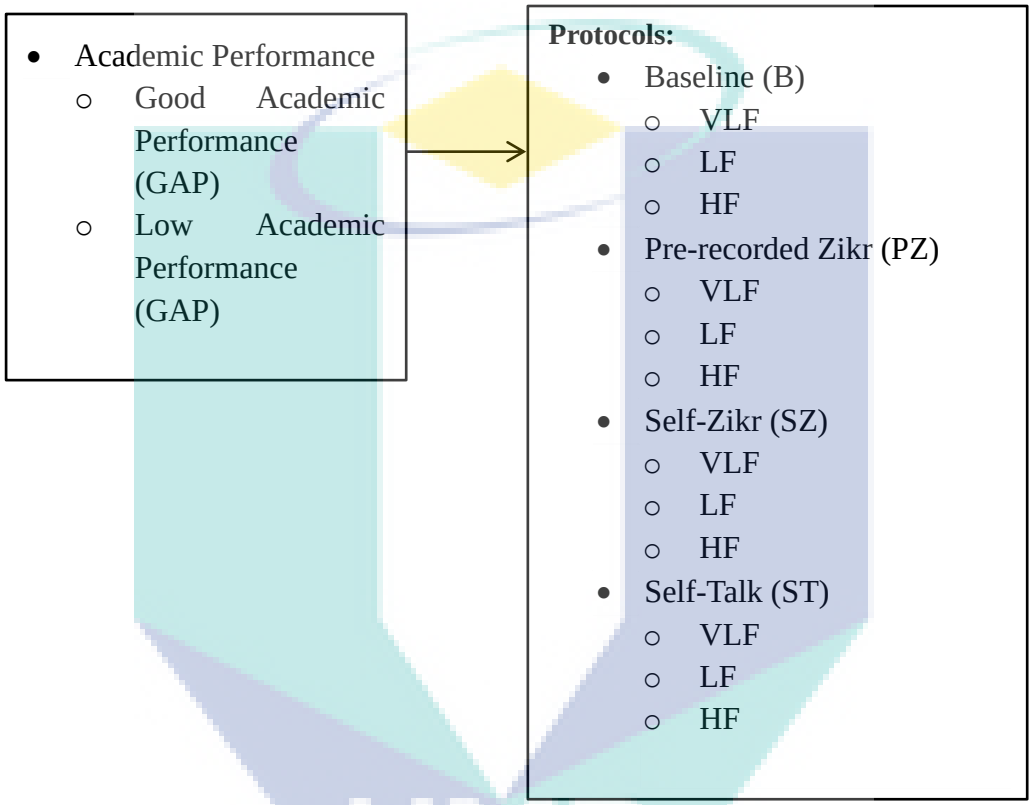

Figure 3.4: Research Conceptual Framework on Analysis of Measuring Laziness Using Heart Rate Variability (HRV).

In the Figure 3.5, is the flows of data processing and analysis that has been utilized, in order to analyse the HRV coherence score among LAP and GAP students.

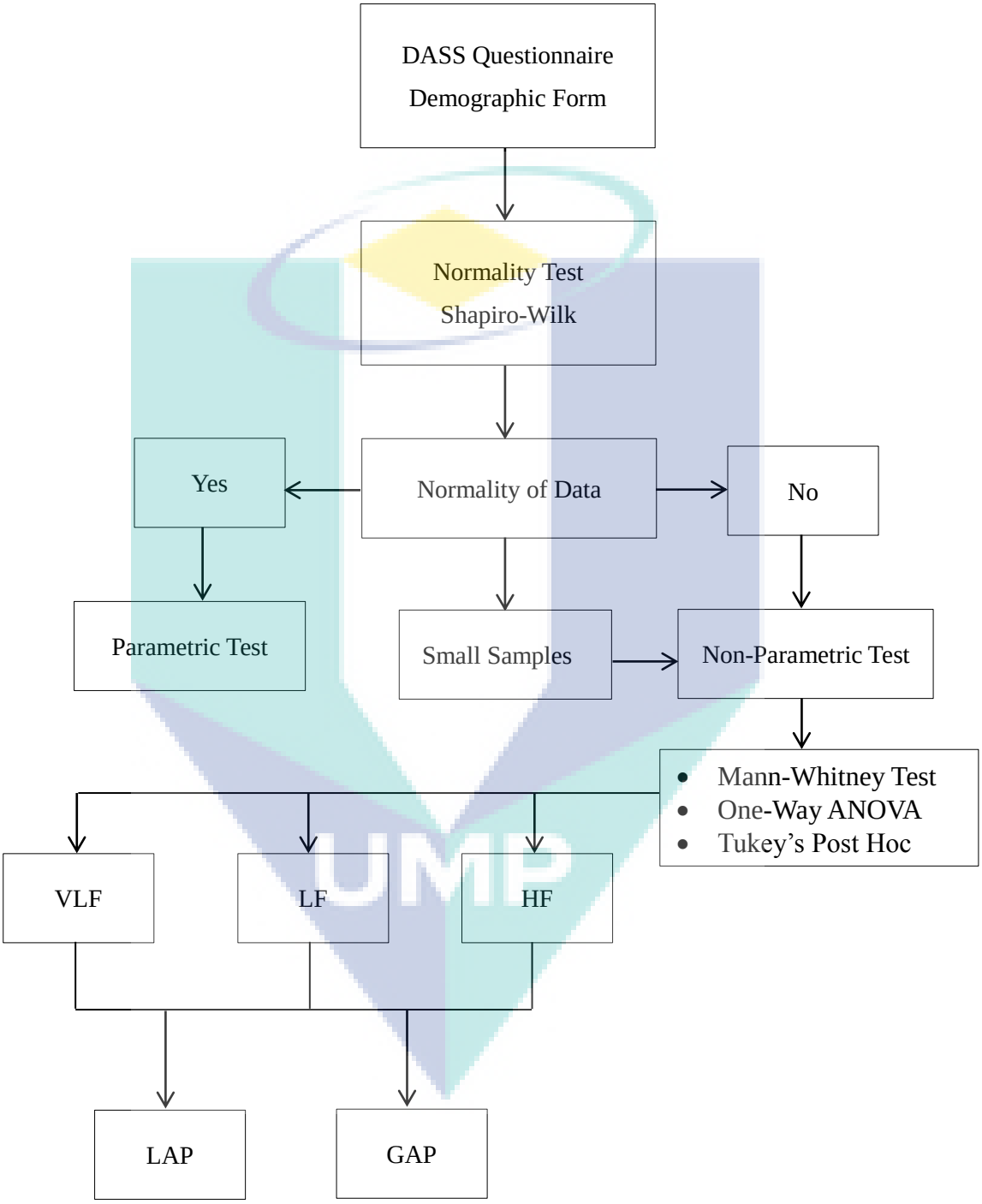

Figure 3.5: Flows of Data Processing and Analysis.

3.3 SCOPE OF RESEARCH

This research involved 20 students at the age of sixteen from Sekolah Menengah Kebangsaan Seri Damai, Kuantan, Pahang, Malaysia, so as to test their laziness trait using the Biofeedback HRV technique. The selection of the school was based on high disciplinary problem records, low academic performances and was reported to have many social problems among students.

The samples would be tested psychophysiologically to determine their levels of balance in the autonomic nerves system which described stress, anxiety and other emotion traits (Schafer & Vagedes, 2012; Blasquez, Font & Ortis, 2009) using HRV. The description of emotions, anxiety and stress which are related to the heart rate, could be the indicator of their self-regulation in achieving the targeted goal in the clinical experiment. This is because Biofeedback HRV is the emotional self-regulation and anxiety reduction technique. Thus, their ability in managing stress and anxiety towards achieving success in the assigned task in the clinical experiment would be the indicator of their levels of laziness, in terms of efforts, motivation and planning strategies.

Besides that, this study would focus on self-regulation to measure laziness because it would investigate their levels of self-control. As the targeted goal in the clinical experiment was to evaluate their self-regulation, their ability to control the condition of their body by following the method instructed by the researcher, is the indicator of their persistence or laziness levels. A self-regulated person would put full efforts with various kinds of strategies, maintain motivation and have strong staying power to achieve the targeted task or goal successfully. Meanwhile a non-self regulated person would falter his/her efforts when facing difficulties, less motivation and and easily giving up after several attempts in performing any given task. Thus, their ability to achieve the targeted goal in the clinical experiment until the end would become the indicator of their self-regulation in any given task.

Thus, in order to achieve the targeted goal in the clinical experiment, the samples would be taught on how to increase the scores in the coherence score by implementing the diaphragmatic breathing technique and reciting zikr. It has been known that these

techniques could increase the performance and balance in the body. The connection between mind and body has significant impact to the measurement in the HRV (Senik & Wahab, 2013; Sutarto & Wahab, 2010).

3.4 PARTICIPANTS

Participants of this research consisted of 20 students from Sekolah Menengah Kebangsaan Seri Damai, Kuantan at the age of sixteen as shown in the Figure 3.6. They would be measured individually using the accuracy of HRV measurement because the scores obtained in the coherence score would describe their balance in the autonomic nerves system. Thus, the number of students in this study was sufficient due to the accuracy in the measurement of HRV which explains their physiology states. They are divided into two groups of academic background in which 10 of them with low academic performance and 10 students with good academic performance in the final examinations. The samples were selected based on their academic performance gathered from School Education Analysis System *(Sistem Analisa Pendidikan Sekolah - SAPS)*(see Appendix L on page 161), which is an analysis for students' advancement in the examinations. It is a centralized system to accumulate all relevant information about examination, in order to accommodate the process of storing the students' current examinations data. It is also to enable scrutiny of the data by the relevant authorities and parents.

The selection of students was based on their academic performance because it is reported that low achievers have exhibited certain attitudes such as avoidance of challenging activities and easily giving up in doing difficult tasks (Cleary, 2006). Thus, to evaluate their self-regulation, this study investigated their behavior on the efforts to seek improvements and learn new skills. In order to achieve the given task, which is to get 100% LF coherence in the power spectrum during the biofeedback training, this study intended to investigate how far the samples have the staying power. It was also to investigate how strong or weak they are in achieving the goal.

Good academic performance could be operationally defined as students who achieve grade B or above in their final examinations. Meanwhile, students who get

grade C and below are operationally defined as low academic performance. The decision to choose the final examination's result was made because it was more accurate in showing achievement and covered all topics that were taught to them throughout the year. This method of participants' selection has been used by Cleary (2006) in their study on development and validation of Self-regulation Inventory Self-Report.

During the biofeedback training in the clinical-experiment, it was done with blind-test. It meant that the students were picked randomly and their laziness would examined without knowing their academic background. This method was being applied in order to avoid bias from the researcher in the communication script stimulation. So, the students were exposed to the script by the researcher in the clinical–experiment.

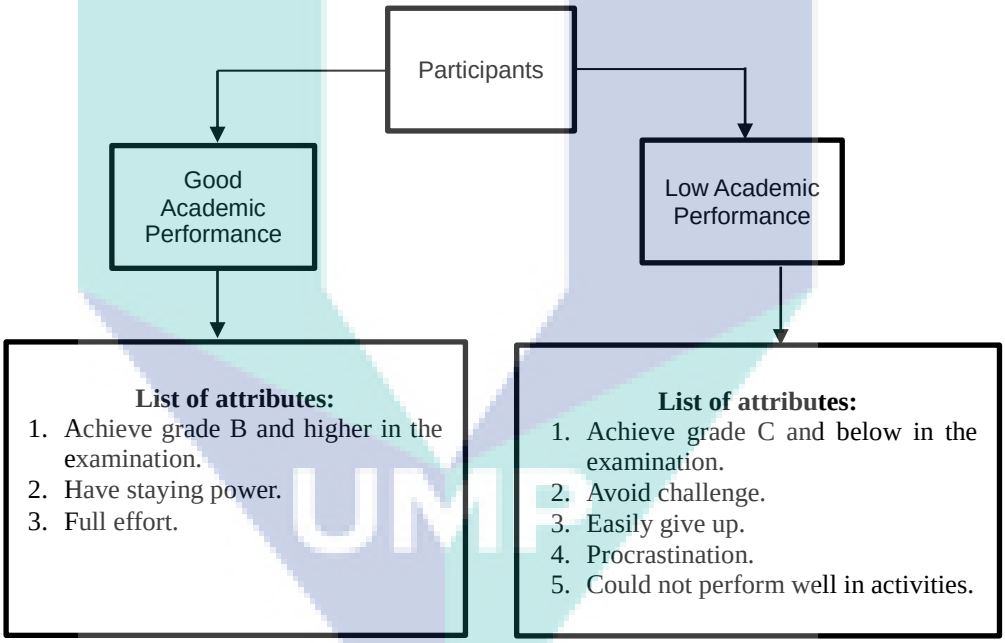

Figure 3.6: Criteria of participants

3.5 RESEARCH INSTRUMENTS

There were pre-procedures of the protocol before the clinical experiment began; (1) the explanation of HRV, (2) demonstration on diaphragm breathing technique, (3) a clinical experiment and (4) distribution and filling up the questionnaires by the students as shown in the Figure 3.2 and 3.3. Before the protocol began, the samples were being

introduced to the *emWave*® PC Stress Relief System kit equipment with ear-clip sensor which is an equipment to measure their heart rate. The purpose of an explanation and demonstration session was to make the samples familiar and comfortable with the equipment and protocol which was important to get a reliable response without any stressful condition that may affect the coherence data.

The researcher asked permission from the school to use two rooms to begin the session. A room which was identified as an explanation room, was used for the students to fill in the form, explanation on the Autonomic Nerves System, Parasympathetic and Sympathetic Nerves System, HRV and demonstration on the Diaphragmatic Breathing Technique and as a place to rest while waiting for their turn to undergo the clinical experiment.

Meanwhile the second room was used for the clinical experimental session. It was an air-conditioning room, with some office equipment such as a comfortable backrest chair and table with a quiet environment. They were asked to sit quietly, without moving, talking, falling asleep or involve in any physically movement during recording the data (Bradley et al., 2010 and Culbert, Martin and Mccraty, 2013).

An introduction and explanation on the biofeedback training protocols were being conducted to the samples before the clinical experiment began. The script was created based on the developed biofeedback script using the Freeze-Frame® Technique as an emotional restructuring tool for sustaining the behavioral change in samples (Thurber et al., 2010) see Appendix I on page 152.

The first explanation was about an overview on HRV, focusing on the purpose of relieving stress, changing behavior, improved psychophysiological health and cognitive performance among individuals who underwent the training session (McCraty, 2002; Lehrer et al., 2003; Lagos et al., 2008; Sutarto & Wahab, 2008), see Appendix D on page 141.

Meanwhile, the explanation on HRV and the relationship with their physiology and emotion states was given to them before the commencement of the clinical

experiment (see Appendix E on page 144). This explanation was done to give some overview on the HRV and the biofeedback training that they would undergo later. Thus, the samples would be comfortable and became relax during the biofeedback training.

Then, the third explanation and demonstration was on the Diaphragmatic Breathing Technique as shown in the Appendix F on page 146. They were being demonstrated the six breaths per minute breathing techniques in order to achieve calmness and to avoid stress within themselves. This relaxation method using breathing techniques was to make them be in a calm condition and relaxed throughout the session. By applying the Diaphragmatic breathing technique, it might increase the HRV coherence score. According to Harris and Coy (2003), for the purpose of concentration and to be calm, a person is advised to make a deep inhalation and exhale while breathing or using diaphragmatic breathing. It is reported that students who did meditation or were using diaphragmatic breathing or taking in deep inhalation while breathing would increase performance and achievement in learning. The slow and controlled pattern of breathing will help to reduce stress and results in calmness. Previous research showed that diaphragmatic breathing is the central of all meditation activities (Paul, Elam & Verhulst, 2007).

The fourth explanation was on an emwave stress relief device to detect the HRV which is attached to an ear clip sensor (see Appendix G on page 148). The explanation was done to provide a condusive environment, in order to make them feel comfortable during the biofeedback training protocols.

Meanwhile, the final explanation was on the clinical experiment with the four protocols which were the baseline, pre-recorded zikir, self-zikr and the self-regulation script as shown in Appendix H on page 150. At this stage, the students were being introduced to the protocols and encouraged to set a target of getting 100 percent of LF coherence throughout the four protocols session.

3.5.1 Questionnaires

In section A, a DASS questionnaire is presented. It is a set of three self-report scales to measure stress, anxiety and depression. Meanwhile Section B is a Demographic Form indicating their age, academic stream, gender and academic performance and an Informed Consent Form (see Appendix B on page 136) before undergoing the four protocols session.

3.5.1.1 DASS Questionnaire

The DASS (Depression, Anxiety, Stress Scale) questionnaire consists of three psychology states to measure the levels of stress, anxiety and depression. The scales contains 21 items which are divided into 7 item per self-report scale (see Appendix C on page 139).

The questionnaire is a Likert scale and the students have to choose only one point of answer given based on their health and psychology condition for the past one week. The 4 likert scale started with 0= Did not apply to me at all, 1 = sometimes, 2= Almost and 3= Most of the time. And the summed scores shown in the Table 3.1.

The scores of the questionnaire are calculated by sum up with the given point to the number of relevant question. The Depression Section takes place in number 1, 3, 6, 8, 12, 15, 16 and The Anxiety Section includes the question of number 2, 5, 7, 13, 14, 17, 18. Meanwhile the Stress Section is the question of number 4, 9, 10, 11, 19, 20, 21.

Table 3.1: DASS Questionnaire's Score

Category	Scale		
	Depression	**Anxiety**	**Stress**
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28	20++	34 ++

3.5.1.2 Demographic Form

This section indicates their age, academic stream, gender, academic performance, experience in breathing technique and co-curricular activities (see Appendix A on page 135). In this study, academic performance has become the independent variable. Meanwhile the coherence score (VLF, LF and HF) is the dependent variable, in order to test how it was influenced by the academic performance of the students. Thus, in the clinical experiment, it will investigate the relationship between academic performance and the coherence score among students. According to the Social Cognitive Career Theory's performance model, academic performance is the function of goal mechanism (Brown et al., 2008).

3.5.2 Interview and Discussion

This study is important to investigate the emotion element in samples which is closely related with ANS. In order to understand the samples from the psychophysiology perspectives, an interview was done by sharing some knowledge from two professional psychiatrists. At the same time, the interview was done to validate the self-regulation stimulation script that has been prepared earlier by the researcher. These interviews involved Dr Umi Adzlin (psychiatrist from Hospital Putrajaya, Kuala Lumpur) and Dr Ramli Musa from Departments of Psychiatry, International Islamic Universitiy Malaysia (IIUM).

Interview with Dr Umi Adzlin was done on 2nd October 2012. On 4th October 2012, a discussion and knowledge sharing with Dr. Ramli Musa took place for about 2 hours (see Appendix J on page 156). We did some amendment on the prepared communication script stimulation focusing on the zikr "*La ilaha illallah.*" The self-regulation stimulation script consists of interpersonal and intrapersonal communication script in order to motivate the students to achieve the targeted goal which is to get 100% LF in the power spectrum during the biofeedback training.

Basically, our discussion was based on the development of the self-regulation stimulation script. The script has been developed by the researcher based on the

HeartMath Biofeedback Training's Script (see Appendix I on page 152) and amended by Dr. Umi Adzlin from Department of Psychiatry, Hospital Putrajaya and Dr. Ramli Musa, a psychiatrist from Islamic International University, Kuantan, Pahang (see Appendix K on page 158). They were being interviewed for knowledge sharing and the script was being discussed focusing on the phrases and sentences. The phrases and sentences used are important so as to make sure the samples were comfortable and became more relaxed during the clinical experimental session. The objectives of the script were also to increase their motivation in achieving the targeted goal. At this stage, their self-regulation towards achieving the goal would be evaluated according to the scores in the power spectrum during investigating the HRV.

3.5.3 Research Design: Clinical Experimental Protocols' Procedures

This Clinical-Experiment (Hager et al., 2014; Peper, Harvey & Takabayashi, 2009; Saini et al., 2009) implemented the *emWave*® PC Stress Relief System, a portable HRV training device. It is intended for home training, a simple and user-friendly tool to detect HRV, invented in 1991 by Doc Childre, the founder of Institute of HeartMath. It was developed and manufactured by Quantum Intech, Inc in Boulder Creek, CA. There are four protocols of the biofeedback clinical experiment, which are baseline, pre-recorded zikr, self zikr and self-talk stimulation. These protocols were done to investigate whether the subjects under test are self-regulated or not. They are given a task to achieve targeted coherence during the clinical experiment.

By using the ear-clip sensor to investigate the samples' HRV, they underwent the four procedures of biofeedback training protocols (see Figure 3.7). They were seated on a comfortable back rest chair, in a quiet and air-conditioned room. This comfortable environment was important in order to make sure that the students were in a good mood and became calm throughout the session without any disruption and disturbance of uncomfortable situations that might affect their emotion. The disruption in their emotion will automatically affect their heart rate and this would make some changes in the data being recorded during the training (Mccraty, Atkinson & Tamasino, 2001).

A 12 inch laptop was set up in front of the students showing the pattern of their heart rhythm, the coherence ratio indicating VLF (red colour), LF (green colour) and HF (blue colour) (see Figure 3.9). The students were provided with a monitor showing their level of heart rate. They were encouraged to achieve 100 per cent LF coherence while undergoing the training through breathing technique and self-*zikr* stimulation.

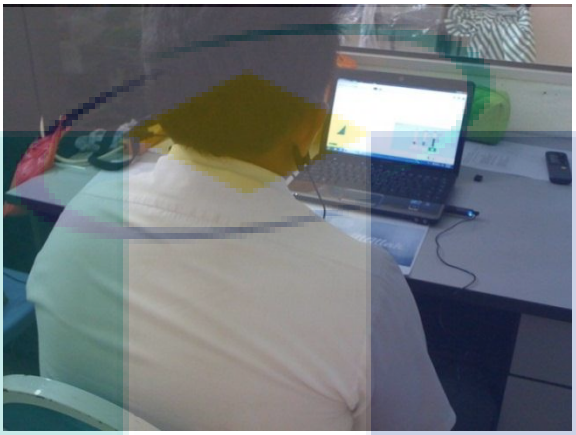

Figure 3.7: Usage of the ear clip sensor.

They were using the device to detect their self-regulation in terms of effort, persistence to achieve 100% LF coherence in the power spectrum. Therefore, the goal set for the samples in the protocols to achieve was 100% LF coherence in the power spectrum as shown in the Figure 3.10. Starting from the pre-recorded zikr, self-zikr and self-talk stimulation, the goal must be achieved to evaluate their self-regulation. A non self-regulated person would show less effort and give up efforts to maintain and increase the scores. Meanwhile, a self-regulated person would be persistent, motivated, seeking for improvement and would finish the given task despite its difficulty. Thus, a self-regulated person would show improvement in their coherence score compared to a non self-regulated person.

They would be exposed to the protocol's script during the clinical experiment. The script should be read behind the sample without he/she noticing the existence of the script as shown in Figure 3.8. It was to create a natural environment as if the script did not exist apparently and was read out verbally by the coach/researcher.

Figure 3.8: Position during the protocol's self-regulation script reading.

This protocol took 3 minutes while reciting the zikr. At this stage, data was collected to measure the average HRV range and coherence ratio percentages. In the exercise, students were expected to achieve LF coherence. The assessment was done according to the students' self-regulation upon the targeted goal. At this stage, the sample was being evaluated on their stay to persist, maintain and increase the targeted coherence score. This was also to evaluate their self-regulation in managing and improving their attitude towards achieving the goal. When the sample was shown his/her achievement in the previous protocols and he/she was encouraged to improve the coherence score.

3.5.3.1 Coherence Score

The power spectrum of the heart rate variability (HRV) is divided into three coherence score which are known as Very Low Frequency (VLF), Low Frequency (LF) and High Frequency (HF). The score for the three categories of frequencies was accumulated to 100 as shown in Figure 3.9.

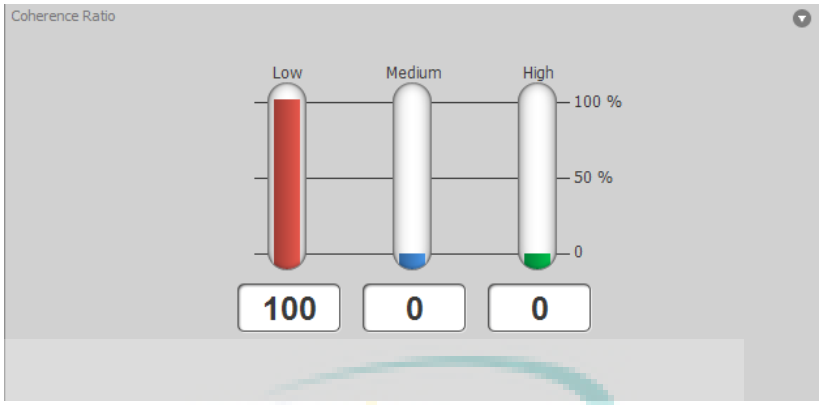

Figure 3.9: A monitor showing the coherence score.

This showed that the increment in one of the category will automatically decrease the other two coherence scores as shown in Figure 3.8. If the sample could achieve 100% HF coherence score, she/he will get 0 score for both VLF and LF.

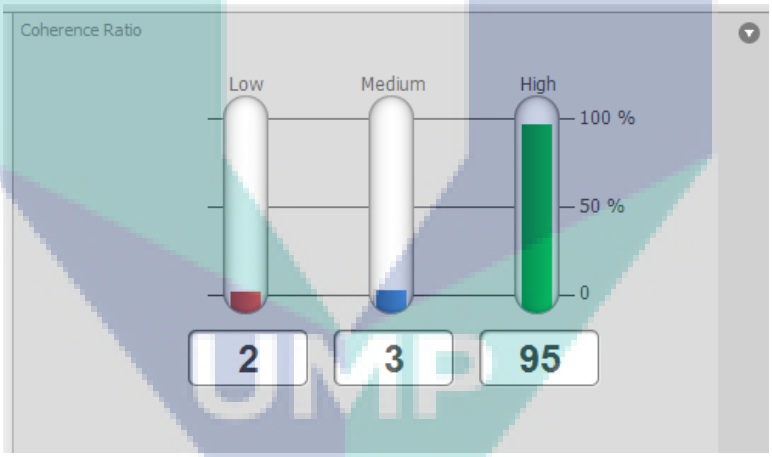

Figure 3.10: A monitor showing the distribution of the coherence score.

Thus, during the protocols, the samples were encouraged to achieve 100% LF coherence score which is indicated by green colour. Meanwhile the HF is shown as a blue colour and VLF, in red colour bar. The coherence ratio for HF, LF and VLF are accumulated to 100%.

According to past studies, a goal is a mechanism to the performance. A persistent student will put efforts and is motivated to the challenging and difficult task

or goal (Brown et al., 2008). Meanwhile a lazy student will loose their competition spirit and finally affect their performance (Hussain & Sultan, 2010).

There are four protocols to measure the student's laziness by using the HRV measurement, namely the baseline, pre-recorded zikir, self-zikr and self-talk as shown in Figure 3.9. These protocols are based and referred to the HRV Biofeedback Training by Lehrer et al. (2000), in order to measure their psychophysiology laziness using HRV. The challenge level was set at the lowest. This clinical experiment was set in the morning at 8.30 a.m. while the students are still fresh and energetic. The duration of each protocols was shown in the Figure 3.11.

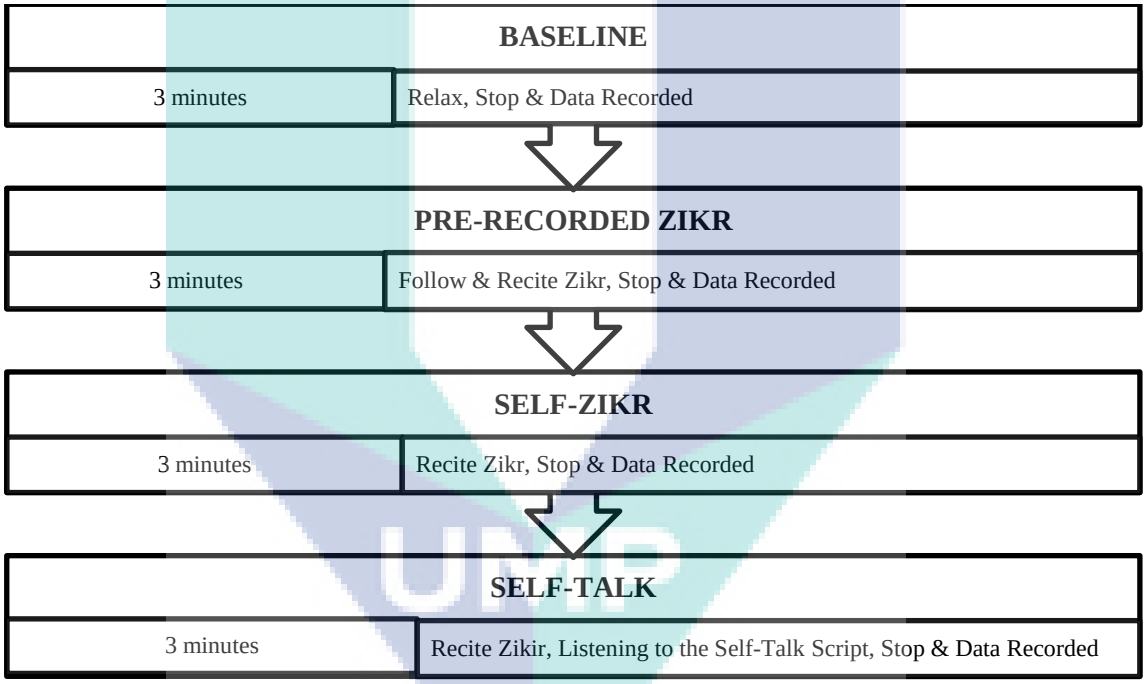

Figure 3.11: Research Design: Procedures of Biofeedback training's protocols

3.5.3.2 Protocol: Baseline

First protocol is called baseline as shown in Figure 3.11. The purpose of measuring baseline or resting condition is to observe the basal physiological activity. It would be compared with other protocols later to investigate their changes in the heart rate.

The students were asked to relax in a normal situation while their heart rate was recorded for 3 minutes. After the baseline was reached, the session was stopped. The time duration was chosen based on the previous study that demonstrated the range of biofeedback training between 1 to 50 sessions depending on the intervention being used (Burgio, Whitehead & Engel, 1985). Meanwhile, in the short term recordings, the spectrum components were calculated with the duration of 2 to 5 minutes (Task Force of the European Society of Cardiology the North American Society, 1996a).

In order to achieve the desired feedback from the training, a sample/patient should be instructed to change their posture, releasing muscle tension, applying slow or deep breathing and visualize on something which is breathinking. A coach should encourage the sample to feel relax and calm during the training. The words and phrases being used might be as follows,

> "Allow your arms to feel heavy and relaxed. Visualize relaxing at the beach on a warm, bright day. You are in a comfortable recliner chair. No one is close by. All you hear are the waves lapping at the shore and sea gulls in the distance. You may feel your hands warming" (Schwartz & Schwartz, 2003).

Or,

> "Please try to relax as deeply as you possibly can" (Schwartz & Goffman, 1995).

The following in the Figure 3.12, is the baseline's self-regulation script before the protocols began, inspired by the above script.

OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
1. To make the students become calm and relax. 2. To practice the diaphragmatic breathing technique.	1. The researcher asked the student to sit and leaning on the backrest chair, put their hands on the thigh while their legs are on the floor and not crossed. 2. The student faced the monitor while an ear clip sensor attached to the student. 3. The researcher asked the student to be calm and relax. 4. Then, the researcher sat behind the student while reading the script without them knowing it. 5. The researcher asked the student to concentrate	*"Saya mahu kamu kosongkan fikiran, tumpukan perhatian sepenuhnya pada sesi ini. Bayangkan kamu berada di sebuah pulau yang tiada penghuni, tenang dan nyaman.* *Saya mahu kamu lupakan segala masalah yang berlegar dalam fikiran. Sekarang hanya ada kamu dan saya. Kamu boleh mula membuat pernafasan diafragma.* *Bertenang…* *Baiklah. Kita akan mulakan sesi ini sekarang."*	1. Chair. 2. Monitor. 3. Ear Clip sensor. 4. Emwave®Stress Relief software. 5. Baseline protocol's script.

-continued-

	on the clinical experiment. 6. The researcher also asked the student to imagine that he/she is alone on a beach and feel the relaxation.		

Figure 3.12: Baseline Protocol's Self-Regulation Script

3.5.3.3 Protocol: Pre-recorded Zikr

The purpose of pre-recorded zikr was to investigate how instruction and difficulties affect their self-regulation in achieving the goal. The pre-recorded zikir took place at 3 minutes. The students were asked to listen and recite the "Lailahaillallah" *zikr* by following the pre-recorded zikr from the voice recorder. The zikr was recited in fast pace while the diaphragm breathing technique demonstrated slow pace of breathing which was to achieve 6 breaths per minute. The contrast in the pace rhythm between pre-recorded zikr and diaphragm breathing technique will measure their effort in finishing a difficult task. Past study has reported that challenging and difficult goal is the mechanism to motivate students to work harder (Brown et al., 2008). Thus, it will affect their performance and persistence. Meanwhile the non self-regulated students will posit negative outcome expectations. According to the previous study, a

difficult task was the impairments in self- control (Van Dellen and Baker, 2011). Thus, it will show which group of academic performance have better achievement towards difficulties, in order to succeed.

They were being encouraged to achieve the 100% LF coherence in the power spectrum. At this stage, students were being tested on their efforts in the targeted goal. The hypothesis in this protocol is that non-self-regulated students, who were lack in efforts and goal, refused to maintain 100 % LF coherence and just listened or followed the pre-recorded zikir with minimal efforts to achieve their target. Meanwhile a self-regulated student was motivated to maintain LF coherence while listening and following the pre-recorded zikr with the purpose of achieving 100 % LF coherence.

The following is the pre-recorded zikr protocol's self-regulation script (see Figure 3.13), in order to motivate the samples to achieve the 100% LF coherence in the power spectrum.

OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
1. To investigate how instruction and difficulties affect their self-regulation in achieving the goal.	1. After the baseline, the researcher asked the student to relax for about half a minute and ready for the next protocol. 2. At this protocol, the sample was being encouraged to maintain calmness and try to achieve the target of reaching the 100% LF coherence score during the	*"Sekarang saya mahu kamu tenangkan fikiran dan fokus kepada matlamat untuk mendapatkan 100% koheren LF. Cuba tenang dan rehatkan diri, tarik nafas dan hembus perlahan-lahan. Tarik… 1,2,3.4 hembus 5,6,7,8,9,10,11. (Ulang skrip) "Tarik… 1,2,3.4 hembus 5,6,7,8,9,10,11" sebanyak 3 kali).* *Saya mahu kamu berzikir mengikut alunan rakaman zikir yang akan saya mainkan sebentar lagi. Sambil berzikir di dalam hati, lakukan teknik pernafasan*	1. Chair. 2. Monitor. 3. Ear Clip sensor. 4. Emwave®Stress Relief software.

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	clinical experimental. 3. The researcher asked the student to recite the zikr of "*La ilaha illallah"* in the heart while following the zikr from the tape recorder. 4. At the same time, he/she would have to breathe using diaphragm while reciting the zikr throughout the protocol. 5. He/she had been reminded that if his/her coherence score is decreasing, she/he would have to apply the diaphragmatic breathing technique, in order to increase the score. 6. After the explanation and the student was ready; the pre-recorded zikr protocol began.	*diafragma yang betul.* *Sekiranya bacaan koheren kamu menurun, lakukan teknik pernafasan diafragma lagi sambil berzikir sehingga bacaan kamu kembali meningkat. Lakukan bersungguh-sungguh, tingkatkan bacaan koheren dan kekalkannya seberapa lama yang boleh.* *Kita mulakan dari sekarang dengan zikir "La ilaha illah."*	5. The baseline protocol's script.

Figure 3.13: Pre-recorded Zikr Protocol's Self-Regulation Script

3.5.3.4 Protocol: Self-Zikr

The purpose of the self-zikr protocol was to investigate their ability, initiative and inner motivation in achieving their goal. The hypothesis here was that a self-regulated person exhibits his/her own initiative, able to upgrade self-achievement and could manage behavior. The third protocol was the self-zikr which allow the sample to recite the "*La ilaha illallah*" zikr with his/her own initiative at own pace, without being forced. However, the targeted goal remained the same which was to achieve the 100% HF coherence score in the power spectrum. The students were asked to recite the inner self-zikr quietly for 3 minutes. After 3 minutes, they were asked to stop the session.

Before starting the self-zikr, the samples were being stimulated using the self-regulation script, in order to motivate them to achieve the targeted goal. A non- self-regulated person would not posit effort, vitality and persistence (Weinsten, Husman and Dierking, 2000). He/she would do it with less effort and would not have the ability to stay in the difficult task. Meanwhile, a self-regulated person, would be managing the environment, seeking for improvement and create his/her own initiative in achieving the goal. A self-regulated person would have a staying power to finish the given task, meanwhile a non-self-regulated person would easily give up (Van Eerde, 2003). This intrinsic motivation derived from the goal he/she wants to achieve, thus would develop a self-regulation in order to succeed (Bandura, 1994). Therefore, the self-zikr is the protocol to evaluate their levels of self-regulation in terms of initiative, staying power, and efforts.

The following is the self-zikr protocol self-regulation script shown in Figure 3.14, prepared in order to motivate the samples to achieve the 100% LF coherence in the power spectrum score.

OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
1. To investigate their ability, initiative and inner motivation in achieving their goal.	1. The researcher asked the student to look at his/her coherence score. 2. He/she was being encouraged to increase or maintain the LF coherence score. But if the coherence score is decreasing, he/she is asked to increase the score by using the diaphragmatic breathing technique. 3. Then, the self zikr began.	*"Sekarang pula, saya mahu kamu berzikir di dalam hati sendirian sambil melihat pada skrin bacaan koheren kamu. Cuba tingkatkan bacaan koheren dan kekalkannya selama mungkin. Jika bacaan menurun, teruskan dengan teknik pernafasan diafragma sehingga mencapai koheren LF.* *Bersedia. Kita mulakan sekarang dengan zikir "La ilaha illallah" di dalam hati."*	1. Chair. 2. Monitor. 3. Ear Clip sensor. 4. Emwave®Stress Relief software. 5. The self-zikr protocol's script.

Figure 3.14: Self-Zikr Protocol's Self-Regulation Script.

3.5.3.5 Protocol: Self-Talk

The purpose of the self-talk self-regulation script stimulation was to make them become calm and focused to their goal in achieving the 100% LF coherence. The self-talk script stimulation is also to increase their motivation in achieving the goal. It was reported that self-talk was positively related to the performance (Laborde et al., 2011). Finally, their focus would drive them to be successful in finishing and achieving the targeted goal. Before the protocol started, the sample was being stimulated by a self-talk script. After 30 seconds reciting the zikr, the sample was being exposed to the self-talk script.

Basically, the self-talk self-regulation script was about the worship and full submission to the Creator, Allah. The script was focusing on a person's responsibility as a servant to the Almighty. They listened to a humble pray while reciting the "*Lailahaillah*" zikr by using an intrapersonal communication script. They were being reminded about their sins, responsibility as a human being in this world. Finally, they witnessed that there is no other God but Allah in a very dramatically slow intonation.

Figure 3.15 shows the self-regulation script before the self-talk protocol begin, in order to achieve the 100% LF coherence in the power spectrum score.

After 30 seconds, the sample was stimulated by the self-regulation script describing the relationship between one's self and the Creator. This script was developed to attain the balance in the Autonomic Nerves System by controlling the emotion. When the sample was in the concentration state, he/she could focus on the targeted goal by possesing self-regulation attitude.

OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
1. To give motivation to improve their coherence score by concentrating on the clinical experiment. 2. To give some motivation.	1. The researcher read the script by asking the student to look at their coherence score performance. 2. The student was asked to feel deeply the meaning of the zikr and he/she was being motivated to improve the coherence score. 3. The student was allowed to have a peace of mind and forget all the problems around. 4. The student was given about 30 seconds to prepare him/herself for the next protocol.	*"Sebentar tadi, kamu sudah melihat keputusan koheren. Jadi berikan sedikit masa untuk diri kamu agar benar-benar menghayati kalimah tersebut.* *Sekarang… saya mahu kamu terus tumpukan perhatian kepada zikir "Lailahaillallah." Saya tahu kamu boleh baiki lagi bacaan koheren yang kamu dapat. Kosongkan fikiran, tumpukan perhatian betul-betul kepada sesi. Sekarang saya mahu kamu lupakan semua masalah. Letakkan ketepi. Buat bersungguh-sungguh zikir ini. Fokus betul-betul kepada kalimah tersebut. Yakin yang kamu boleh dapatkan bacaan 100% koheren LF. Saya yakin kamu boleh.!* *Sekali lagi…cuba bertenang, tarik dan hembus nafas perlahan-lahan. Sekarang letakkan tangan kamu di bahagian perut.Cuba rasakan udara yang masuk perlahan-lahan ke dalam paru-paru kamu, terus ke bahagian otak, mengalir ke seluruh anggota badan.* *Tarik…. Hembus perlahan-lahan… Kita mulakan sekali lagi. Tarik…… Hembus perlahan-lahan…. (2 kali). Sekarang mulakan zikir di dalam hati … "Lailahaillallah… (intonasi rendah dan panjang). Teruskan berzikir Lailahaillallah…(2 kali)."*	1. Chair. 2. Monitor. 3. Ear Clip sensor. 4. Emwave®Stress Relief software. 5. Self-regulation Script before the Self-Talk protocol.

Figure 3.15: Self-Regulation Script before the self-talk protocol's begin

The following is the self-regulation script before the self-talk protocol began as shown in Figure 3.16, in order to achieve the 100% LF coherence in the power spectrum score.

OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
1. To increase focus to their goal in achieving the 100% LF coherence. 2. To achieve stable emotion by feeling the meaning of worship to the Creator. 3. To make them become calm.	1. The script wasread by asking the student to really feel the meaning of the *"La ilaha illallah"* zikr with humility and repentance. 2. The student was asked to imagine that he/she is standing in front of the Creator and was also asked to regret for forgetting to remember the Almighty Creator. 3. The student was asked to regret for committing the sins before. 4. The script was continued to be read on bearing witness or swearing that there is no god but Allah. 5. The student was asked to continue reciting the zikr until the researcher command him/her to stop.	*"Cuba hayati kalimah "La ilaha illallah" dengan penuh rasa insaf… rasa rendah diri… rasa seorang hamba kepada Pencipta Yang Maha Agung.* *Bayangkan anda sedang berada betul-betul di hadapan Allah swt. (Berhenti sebentar) Tundukkan wajah anda di hadapan Yang Maha Besar dengan rasa penuh insaf.* *Bisikkan di dalam hati …"Ya, Allah, hambaMu ini telah lalai dalam mengingatiMu, Ya, Allah.* *Sesungguhnya aku telah menzalimi diriku sendiri, wahai Tuhanku. Bantulah aku kembali ke jalan Mu ya, Allah.* *Dengarlah pengakuan diriku yang banyak dosa ini, Yang Maha Agung. Lailahaillallah… Tiada Tuhan yang disembah melainkan Allah (Berhenti sebentar).*	1. Chair. 2. Monitor. 3. Ear Clip sensor. 4. Emwave® Stress Relief software. 5. The self-talk protocol's script.

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	6. Also, the student was asked to look at the coherence score performance and tried to increase or maintain it by applying the diaphragmatic breathing technique.	*Teruskan membaca "La ilaha illallah" di dalam hati sehingga saya bagi isyarat berhenti. Teruskan berzikir… "La ilaha illallah…"La ilaha illallah* *Sambil itu, lihat bacaan koheren kamu. Cuba tingkatkan lagi. Bernafas perlahan-lahan dan teruskan berzikir…* *"La ilaha illallah…."La ilaha illallah…"*	

Figure 3.16: Self-talk Protocol's Self-Regulation Script

3.6 PILOT STUDY ANALYSIS

The pilot study involved eight samples consisted of boys at the age of sixteen. From the clinical experiment, the data was being analyzed.

3.6.1 Differences of VLF, LF and HF Using Mann-Whitney *t*-test for Pilot Study

From the t-test, there was a significant difference in the mean value of VLF for the Self-Zikr protocol among academic performance (t=-4.04, p=0.01), where the low academic performance had higher mean value (77.50±11.21) compared to the good academic performance (47.75±9.54) as shown in the Table 3.2.

Meanwhile, the mean value of the HF in the Self-Zikr protocols among academic performance was significant at the t=2.38, p=0.05. Good academic performance had higher mean value (22.25±12.37) compared to the low academic performance (6.00±5.83).

Table 3.2: Mann-Whitney *t-test* for the mean value of VLF, LF and HF between academic performances in the protocols.

Protocols	CS	Academic Performance	*n*	Mean	Std. Deviation	Mean Difference	*t*	*p*
Baseline	VLF	GAP	4	45.75	4.92	-3.25	-0.27	0.80
		LAP	4	49.00	23.42			
	LF	GAP	4	34.00	16.19	-5.50	-0.48	0.65
		LAP	4	39.50	16.11			
	HF	GAP	4	20.25	14.36	8.75	0.85	0.43
		LAP	4	11.50	14.80			
Pre-Recorded-Zikr	VLF	GAP	4	70.50	23.91	28.25	2.32	0.06
		LAP	4	42.25	4.57			
	LF	GAP	4	17.00	11.58	-11.75	-1.40	0.21
		LAP	4	28.75	12.09			
	HF	GAP	4	12.25	14.66	-16.75	-1.99	0.09
		LAP	4	29.00	8.29			
Self-Zikr	VLF	GAP	4	47.75	9.54	-29.75	-4.04	0.01**
		LAP	4	77.50	11.21			
	LF	GAP	4	30.00	20.12	13.25	1.15	0.29

Table 3.2: Continued

Protocols	CS	Academic Performance	*n*	Mean	Std. Deviation	Mean Difference	*t*	*p*
		LAP	4	16.75	11.24			
	HF	GAP	4	22.25	12.37	16.25	2.38	0.05**
		LAP	4	6.00	5.83			

** Significant $p<0.05$
B = Baseline
PZ = Pre-recorded-Zikr
SZ = Self-Zikr
CS = Coherence Score
GAP = Good Academic Performance
LAP = Low Academic Performance

3.6.2 Differences of VLF, LF and HF Using the One-Way ANOVA test for Pilot Study

Table 3.3 shows an analysis of the One Way ANOVA test, which indicates that there was no significant difference statistically ($p>0.05$) between the mean values of the VLF, LF and HF and the protocols (Baseline, Pre-recorded Zikr dan Self-Zikr) for the good academic performance (GAP).

Table 3.3: One Way ANOVA of VLF, LF, HF between protocols for Good Academic Performances (GAP).

AP	CS	Protocols	*n*	Mean	Std. Deviation	Minimum	Maximum	*f*	*p*
1=GAP	VLF	Baseline	4	45.75	4.92	41.00	50.00	3.30	0.08
		Pre-recorded Zikr	4	70.50	23.91	39.00	97.00		
		Self-Zikr	4	47.75	9.54	35.00	58.00		
	LF	Baseline	4	34.00	16.19	23.00	58.00	1.18	0.35
		Pre-recorded Zikr	4	17.00	11.58	0.00	26.00		
		Self-Zikr	4	30.00	20.12	18.00	60.00		
	HF	Baseline	4	20.25	14.36	0.00	33.00	0.59	0.58
		Pre-recorded Zikr	4	12.25	14.66	3.00	34.00		
		Self-Zikr	4	22.25	12.37	5.00	34.00		

Notes: $p<0.05$
AP = Academic Performance
CS = Coherence Score
GAP = Good Academic Performance

Meanwhile, for the low academic performance (LAP), the analysis of ANOVA test indicates that there was a significant difference in the VLF for the protocols of Baseline, Pre-recorded Zikr dan Self-Zikr (f=6.04, p=0.02). The Self-Zikr protocol indicated the highest mean value, 77.50±11.21 and the Pre-recorded Zikr was the lowest mean value, 42.25±4.57 as shown in Table 3.4.

Besides that, in Table 3.4, the ANOVA test also indicates that there was a significant difference in the HF for the protocols (Baseline, Pre-recorded Zikr and Self-Zikr) for the Low Academic Performance (f=5.38, p=0.03). According to the results obtained, the Pre-recorded Zikr produced the highest mean value at 29.00±8.29 and the Self-Zikr was the lowest at 6.00±5.83.

Table 3.4: One Way ANOVA of VLF, LF, HF between protocols for Low Academic Performances.

AP	CS	Protocols	*n*	Mean	Std. Deviation	Minimum	Maximum	*f*	*p*
2=LAP	VLF	Baseline	4	49.00	23.42	19.00	70.00	6.04	0.02 **
		Pre-recorded Zikr	4	42.25	4.57	37.00	48.00		
		Self-Zikr	4	77.50	11.21	64.00	89.00		
	LF	Baseline	4	39.50	16.11	26.00	58.00	2.92	0.11
		Pre-recorded Zikr	4	28.75	12.09	18.00	46.00		
		Self-Zikr	4	16.75	11.24	5.00	32.00		
	HF	Baseline	4	11.50	14.80	0.00	33.00	5.38	0.03 **
		Pre-recorded Zikr	4	29.00	8.29	17.00	35.00		
		Self-Zikr	4	6.00	5.83	0.00	14.00		

** Significant p<0.05
AP = Academic Performance
CS = Coherence Score
LAP = Low Academic Performance

3.6.3 Differences of VLF, LF and HF Using the Tukey's HSD Post-Hoc test for Pilot Study

The Post hoc test indicates that there was a significant difference in the mean value of VLF between baseline and the self-zikr protocol (p=0.03) as shown in the Table 3.5. There was also a significant difference in the mean value of VLF between the pre-

recorded-zikr and the self zikr (p=0.01). Meanwhile for the mean value of LF, the post hoc test indicates that there was a significant difference between the baseline and the self zikr (p=0.04).

Besides that, the post hoc test also indicates that there was a significant difference in the mean value of HF between that the Baseline and the Pre-recorded Zikr protocols (p=0.04). The result also shows that there was also a significant difference in the mean value of VLF between the Pre-recorded Zikr and the Self-Zikr protocol (p=0.01).

Table 3.5: Tukey's HSD Post hoc test of the VLF, LF, HF between protocols for Low Academic Performance (LAP).

AP	CS	Protocols		Mean Difference
2=LAP	VLF	Baseline	Self-Zikr	-28.50
		Pre-recorded Zikr	Self-Zikr	-35.25
	LF	Baseline	Self-Zikr	22.75
	HF	Baseline	Pre-recorded Zikr	-17.50
		Pre-recorded Zikr	Self-Zikr	23.00

Notes: p<0.05
AP = Academic Performance
CS = Coherence Score
LAP = Low Academic Performance

As a summary, the pilot test of eight samples indicated that in the VLF, the low academic performance (LAP) have the highest score (m=77.5) for the Self-Zikr protocol, as shown in Figure 4.17. Meanwhile, in the LF, the good academic performance (GAP) gave the highest score (m=30) in the Self-Zikr protocol. Besides, in the HF, low academic performance (LAP) indicated the highest score (m=29) in the Pre-recorded Zikr.

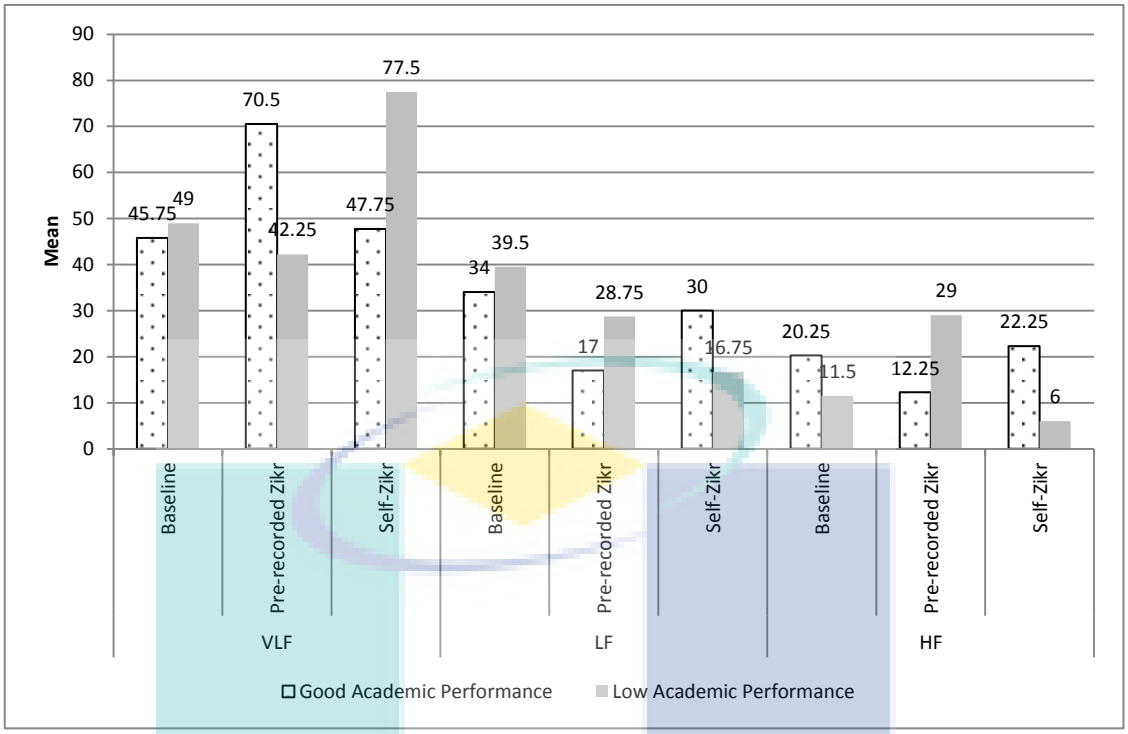


Figure 3.17: Mean values of the VLF, LF and HF between protocols.

As a summary, chapter 3 discussed on the development and implementation of the self-regulation script in the clinical experimental's protocols. The samples were being evaluated on their self-regulation towards the given tasks in different kind of protocols. Thus, their heart rates were being investigated from the baseline until the self-talk protocols. The implementation of diaphragm breathing technique and reciting zikr with full effort during the protocols would affect their scores in the heart rates. In Chapter 3, which comprises of Methodology, is an explanation of research's scope and instruments that were used to measure laziness from the HRV perspectives. The instruments of research consists of questionnaires (DASS questionnaire), interviews and discussions with the psychiatrists and the clinical experimental involving the sixteen year-old students. In the clinical experimental, the self-regulation stimulation script were being implemented to investigate their achievement goal orientation.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 INTRODUCTION

This chapter discusses the analysis of the relationship between HRV and self-regulation among 20 samples at the age of sixteen. The self-regulation aspects was utilized throughout the four protocols; baseline, pre-recorded zikr, self-zikr and self-talk. Thus, laziness was measured by investigating the analysis in the VLF, LF and HF coherence score.

4.2 PRELIMINARY ANALYSIS

Data was first examined for normality of variance, missing data and random or systematic errors with SPSS 20.0 (SPSS Inc., 2010).

4.3 TYPES OF ANALYSES

Parallel with the above purpose, a non-parametric Tests called *Mann-Whitney t-test*, One Way ANOVA and Tukey's HSD Post Hoc Test were used to investigate the differences between two independent groups which are low academic performance (LAP) and good academic performance (GAP) on a continuous measurement which was called the Coherence Score (CS) that consists of VLF, LF and HF. This test compared means among variables. It converted the score on the CS to ranks across the two groups which were good and low academic performance. Finally, the analysis evaluated whether the two groups of the academic performances were significantly different or not.

4.4 OBJECTIVES OF THE STUDY

The following are the objectives of the data analysis:

1. To identify the difference in VLF, LF and HF in the Baseline (B) protocol in terms of academic performance.
2. To identify the difference in VLF, LF and HF in the Pre-Recorded Zikr (PZ) protocol in terms of academic performance.
3. To identify the difference in VLF, LF and HF in the Self-Zikr (SZ) protocol in terms of academic performance.
4. To identify the difference in VLF, LF and HF in the Self-Talk (ST) protocol in terms of academic performance.

4.5 TESTS OF THE HYPOTHESIS

The hypothesis of data analysis was:

Ho1 There is no significant difference in the VLF, LF and HF of Baseline, Pre-recorded Zikr, Self-Zikr and Self-Talk protocol between good and low academic performance of the sixteen year-old students.

4.6 ASSESSING NORMALITY

Normality test on VLF, LF and HF were conducted through Normal Q-Q Plots, Detrended Normal Q-Q Plots and Shipiro-Wilk statistic. The analysis of Normal Q-Q plots for VLF, LF and HF indicated that the majority of the observations were located close to the trend line. Meanwhile, the Detrended Normal Q-Q plot yielded that random distribution and detrended values around the zero means.

Based on Table 4.1, a Shapiro-Wilk test for normality on VLF, LF and HF was not significant at 0.05 (p=0.00; p=0.03; p=0.03). These results indicate that the distribution of the data did not depart significantly from the normal distribution.

Table 4.1: Normality test on VLF, LF and HF among academic performances

		Shapiro-Wilk	
CS	**Statistic**	***df***	***p***
VLF	0.84	20	0.00
LF	0.89	20	0.03
HF	0.89	20	0.03

Note: p=0.05
CS = Coherene Score

Meanwhile in Table 4.2, 4.3 and 4.4, a Shapiro-Wilk test for normality on Dass for Depression, Anxiety and Stress were not significant at 0.05 (p=0.00). Thus, the data was normal.

Table 4.2: Normality test on DASS for Depression

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	***df***	**Sig.**	**Statistic**	***df***	**Sig.**
Academic Performance	..335	20	0.00	.641	20	0.00

Note: p=0.05

Table 4.3: Normality test on DASS for Anxiety

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	***df***	**Sig.**	**Statistic**	***df***	**Sig.**
Academic Performance	..335	20	.000	.641	20	.000

Note: p=0.05

Table 4.4: Normality test on DASS for Stress

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	***df***	**Sig.**	**Statistic**	***df***	**Sig.**
Academic Performance	..335	20	.000	.641	20	.000

Note: p=0.05

4.7 FISHER'S EXACT TEST FOR GENDER AND DASS QUESTIONNAIRE (DEPRESSION, ANXIETY AND STRESS)

According to the Fisher's Exact Test in Table 4.5, there was no significant difference statistically between academic performance and gender and DASS Questionnaire for Depression, Anxiety and Stress (p>0.05). Table 4.5 based on the academic performances, there was no difference between male and female students (p=0.66). The DASS Questionnaire for Depression (p=0.00), Anxiety (p=0.35) and Stress (p=0.21) was normal for both academic which indicated that there was no significant difference statistically.

Table 4.5: Fisher's Exact Test for comparison of Academic Performances with Gender and DASS Questionnaire for Depression, Anxiety and Stress

		Academic Performance	
Factor		**GAP**	**LAP**
Gender	1=male	6 (60.0)	4 (40.0)
	2=female	4 (40.0)	6 (60.0)
DASS for Depression	Normal	10 (100.)	10 (100)
DASS for Anxiety	Normal	5 (50.0)	8 (80.0)
DASS for Stress	Normal	7 (70.0)	10 (100)

Note: p>0.05

4.8 DIFFERENCES OF PROTOCOL IN TERMS OF ACADEMIC PERFORMANCES

This part would explain the differences among protocol baseline (B), pre-recorded zikr (PZ), self-zikr (SZ) and self-talk (ST), in terms of academic performance.

4.9 DIFFERENCES OF BASELINE, PRE-RECORDED ZIKR, SELF-ZIKR AND SELF-TALK USING THE MANN-WHITNEY *t*-TEST

An analysis of Mann-Whitney test was utilized to achieve the objectives. This t-test was used due to the small size of sample (n=20) which was below 30 person.

In order to test the Ho1, the *t-test* was used. An analysis of *t-tests* indicated that there was a significant difference in VLF Self Zikr (t=-2.25, p=0.05) where the mean values of low academic performance (LAP) was higher (54.60±37.41) compared to the good academic performance (GAP), 21.80±26.82. The differences of means were -32.80 as shown in the Table 4.6.

The Mann-Whitney *t-test* showed the differences of mean values in the baseline, Pre-recorded Zikr, Self-Zikr and Self-Talk protocols between 10 person of good and 10 person of low academic performance. It showed that the LAP students have higher score in the VLF during the Self-Zikr compared to GAP. Meanwhile, in the Pre-recorded Zikr, Self-Zikr and Self-Talk there were no significant differences statistically with the *p* value more than 0.05. These results were obtained due to the reaction in the decrement of the parasympathetic nerves system during the protocols in the biofeedback training (Bailon et al., 2010). Previous study also has revealed that an anxious student has problem in concentration, focus and determination of action (Paul & Garg, 2012).

Table 4.6: *Mann-Whitney t-test* results for differences in the protocols by academic performance.

Protocols	CS	AP	*n*	Mean	Std. Deviation	Mean Difference	*t*	*p*
Baseline	VLF	GAP	10	15.20	19.09	-4.20	-0.49	0.63
		LAP	10	19.40	18.91			
	LF	GAP	10	16.30	16.52	0.10	0.01	0.99
		LAP	10	16.20	14.76			
	HF	GAP	10	68.50	33.38	4.10	0.29	0.78
		LAP	10	64.40	30.28			
Pre-Recorded Zikr	VLF	GAP	10	26.40	24.15	-15.10	-1.39	0.18
		LAP	10	41.50	24.51			
	LF	GAP	10	19.30	12.20	3.50	0.81	0.43
		LAP	10	15.80	6.30			
	HF	GAP	10	54.30	29.52	11.60	0.92	0.37
		LAP	10	42.70	26.75			
Self-Zikr	VLF	GAP	10	21.80	26.82	-32.80	-2.25	0.04**
		LAP	10	54.60	37.41			
	LF	GAP	10	33.50	37.19	5.50	0.37	0.72
		LAP	10	28.00	29.01			

Table 4.6: Continued

Protocols	CS	AP	*n*	Mean	Std. Deviation	Mean Difference	*t*	*p*
	HF	GAP	10	36.40	39.65	10.70	0.65	0.52
		LAP	10	25.70	33.48			
Self-Talk	VLF	GAP	10	15.00	20.48	-12.00	-1.00	0.33
		LAP	10	27.00	31.78			
	LF	GAP	10	11.10	11.90	-6.30	-1.08	0.29
		LAP	10	17.40	14.08			
	HF	GAP	10	73.90	28.17	22.30	1.55	0.14
		LAP	10	51.60	35.86			

Note: **p < 0.05
CS = Coherence Score
AP = Academic Performance

Figure 4.1 shows the results of *t-test* for mean values in the Baseline protocol between academic performances. The results compared the coherence score in the VLF, LF and HF during the clinical experimental test. The bar chart indicates that the GAP have the highest score (*m*=68.5) in the LF coherence score compared to the LAP (*m*=64.4) in the Baseline protocol. Meanwhile the VLF (*m*=15.2 for the GAP; *m*=19.4 for the LAP) and HF scores (*m*=16.3 for GAP; *m*=16.2 for LAP) were low in both group of academic performance.

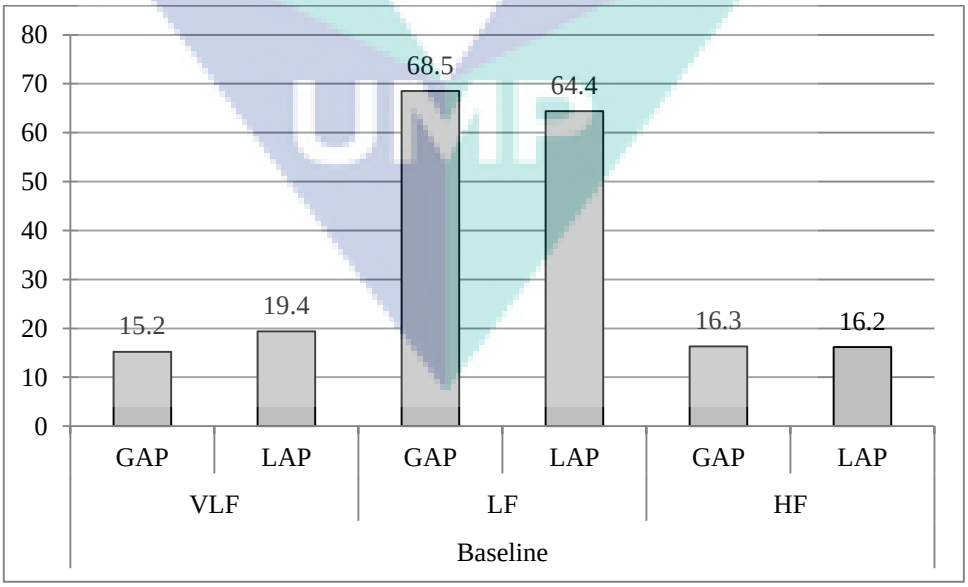


Figure 4.1: Mean values for the baseline protocol among academic performances.

Figure 4.2 illustrates the comparison between VLF, LF and HF coherence score during the Pre-recorded Zikr protocol. It indicates that the good academic performance (GAP) have highest LF coherence score (*m*=53.3) compared to the low academic performance (LAP), *m*=42.7. The higher result in the LF for the GAP students was parallel with the previous study by Givvin et al. (2001) which stated that positive emotional would affect behavior in terms of efforts and persistence. The GAP students were reported to plan strategy to improve performance (Qi et al., 2010). Meanwhile in the VLF coherence score, LAP students (*m*=41.5) indicated higher score compared to the GAP students (*m*=26.4). However, the HF score for LAP (*m*=15.8) and GAP (*m*=19.3) students were at the lowest. The lowest score in the LF for LAP indicated that these groups failed to achieve 100% LF in the Pre-recorded Zikr protocol as the targeted goal in the clinical experiment.

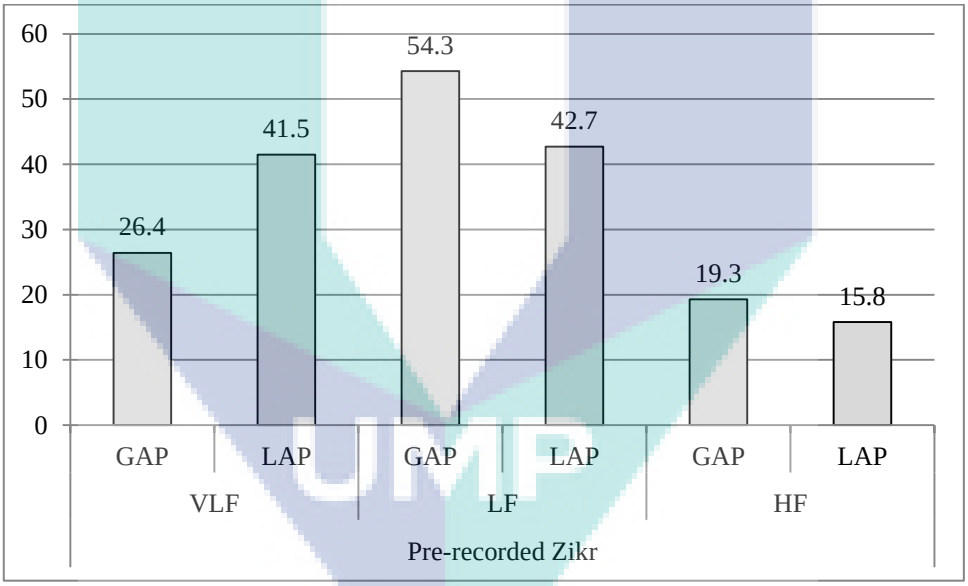


Figure 4.2: Mean values for the Pre-recorded Zikr protocol among academic performances.

Meanwhile, Figure 4.3 illustrates the comparison on the mean values in the Self-Zikr protocol for GAP and LAP students. It was indicated that the VLF for LAP (*m*=54.6), was the highest score compared to the GAP (*m*=21.8) during the Self-Zikr protocol. Meanwhile, in the LF coherence score, it was indicated that the GAP students have higher score (*m*=36.4) compared to the LAP students (*m*=25.7). It also indicated

the same result where the GAP students have higher score (*m*=33.5) compared to the LAP students (*m*=28) in the HF coherence score. The higher results in the HF might due to some attentional task, mild stress, a cognitive reaction on orienting response and reduction in parasympathetic cardiac control (Quigley & Berntson 1990; Berntson & Cacioppo, 2000). Again, in the self-zikr protocol, the LAP students failed to achieve the highest scores in the LF coherence scores which showed that they were not self-regulated to achieve the targeted goal successfully. This indicated that when the samples loose control on the targeted goal, the response for the frequency in the VLF scores becomes higher (Calero et al., 2007). The higher VLF coherence score by the LAP students were also supported by Kuhl and Kraska (1993) in their research, which indicated that the low performance students have poor self-regulation attitude towards given tasks. Meanwhile, they found that high-IQ children were able to pay attention on the instructions to be followed towards targeted goal.

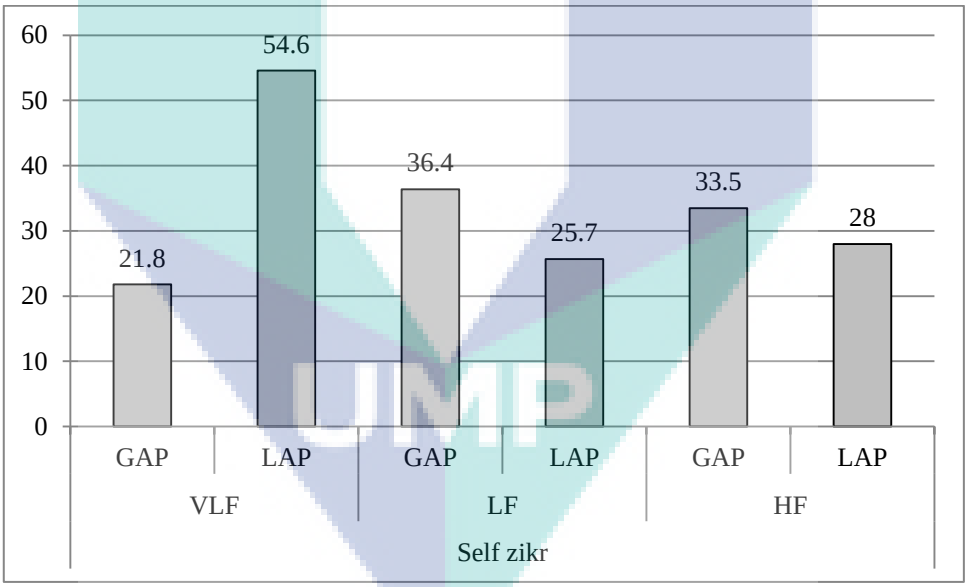


Figure 4.3: Mean values for the Self Zikr protocol among academic performances.

Finally, the students underwent the Self-Talk protocol which demonstrated that the GAP students have the highest coherence score in the LF (*m*=73.9) compared to the LAP (*m*=51.6). It was illustrated in Figure 4.4, which showed the comparison of the mean values among LAP and GAP.

In the Self-Talk protocol, the coherence score for VLF indicated that the GAP have lower score (*m*=15) compared to the LAP (*m*=27). Meanwhile the HF coherence score for the GAP students was lower (*m*=11.1) compared to the LAP students (*m*=17.4). Finally, in the Self-Talk protocol, the LAP students totally failed to self-regulate themselves in achieving the 100% LF coherence score. This indicated that the LAP students have low effort, motivation and self-regulation in terms of achieving goal in the task given.

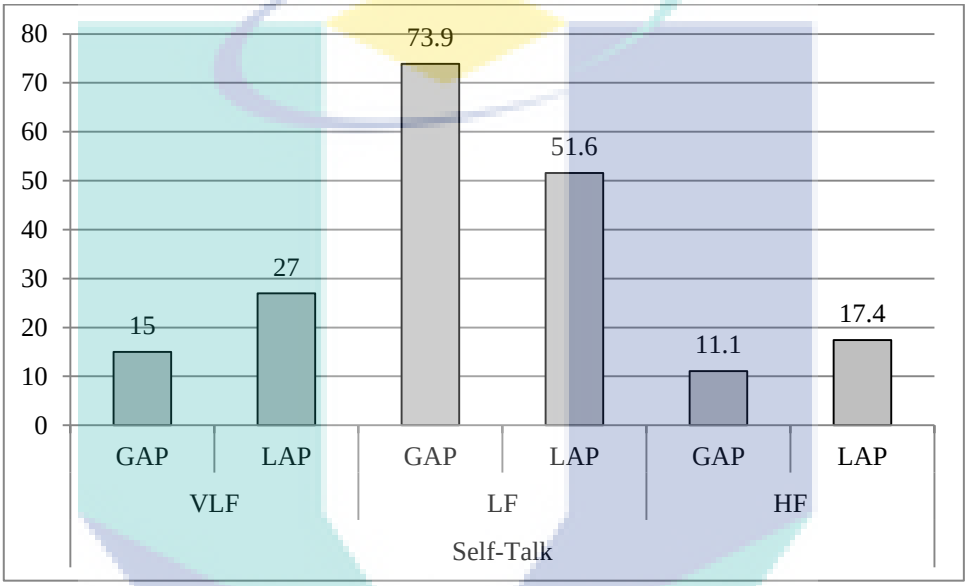


Figure 4.4: Mean values for the Self-Talk protocol among academic performances.

As a summary, the LAP students failed to achieve 100% LF coherence scores in all protocols which indicated that they are non-self regulated individuals in order to finish the task successfully. They have higher results in the VLF coherence score. As were investigated in the previous study on the effectiveness of self-relaxation, the six breaths per minute and reciting zikr during the biofeedback training and techniques, the VLF coherence score should decrease parallel with the increment in the LF score (Sutarto, 2012; Senik & Wahab, 2013). It showed that they failed to implement the biofeedback training where they easily gave up to achieve the targeted goal by failing to apply the method to increase the scores in the LF.

However, the GAP students successfully achieved the targeted goal during the clinical experiment which indicated that they have put their full effort, high motivation and followed the instructions to achieve the 100% LF coherence score. The higher results in the LF coherence score was related to the sympathetic cardiac control and a decrement in the parasympathetic control, sometimes involved both, as a sign of stress (Berntson and Cacioppo, 2000). The results obtained from the clinical experiment were consistent with the study done by Calero et al, (2007), in terms of self-regulatory persistence among the GAP students. It was reported that the goal orientation will make them become proactive, have the ability in problem solving and could easily adapt to the new environment (Lunenburg, 2011; Cleary, 2006; Klassen et. al., 2008; Mccloskey, 2011; Michinov et al., 2011).). Their findings are positively consistent with this study, in terms of self-regulation by investigating their performance during the protocols.

This self-regulatory persistence was parallel with the previous research which also revealed that laziness or persistence while finishing the given task was an indicator to measure self-regulation/control (Baumeister et al., 1998). It was because various kinds of difficulties will test their self-control on how persistent they were while undergoing the protocols. Thus, the self-regulated student could be conclude as a persistent, meanwhile the non-regulated student was practicing laziness.

4.10 DIFFERENCES OF BASELINE, PRE-RECORDED ZIKR, SELF-ZIKR AND SELF-TALK USING THE ONE-WAY ANOVA TEST

In order to test the differences of VLF, LF and HF in the protocols (Baseline, Pre-recorded Zikr, Self-Zikr and Self-Talk) between good and low academic performance, the One Way ANOVA was used.

The ANOVA test indicated that there were no significant differences statistically in the mean value between protocols and the good academic performance (GAP), as shown in Table 4.7. The One Way ANOVA test was done to test the differences of VLF, LF and HF coherence score among the 10 person of the GAP students. In the VLF coherence score during the Baseline, Pre-Recorded Zikr, Self-Zikr and Self-Talk, there

were no significant differences statistically in terms of academic performance. The analysis yielded a *f*-ratios value of 0.59 which was not significant at the 0.63 (p<0.05).

Meanwhile, in the LF coherence score, the GAP students indicated that there were no significant differences statistically in terms of academic performance. The analysis yielded a *f*-ratios value of 1.89 which was not significant at the 0.15 (p<0.05).

Besides that, during the protocols in the clinical experimental, the HF coherence score yielded a *f*-ratios value of 2.58 which was not significant at the 0.07 (p<0.05). Thus, this indicated that the VLF, LF and HF coherence score was not significant statistically in terms of good academic performance.

Table 4.7: One Way ANOVA test for differences of VLF, LF and HF between protocols for Good Academic Performances (GAP).

AP	CS	Protocols	*n*	Mean	Std. Deviation	Minimum	Maximum	*f*	*p*
1=GAP	VLF	Baseline	10	15.20	19.09	0	48	0.59	0.63
		Pre-recorded Zikr	10	26.40	24.15	0	73		
		Self zikr	10	21.80	26.82	0	72		
		Self-Talk	10	15.00	20.48	0	65		
	LF	Baseline	10	16.30	16.52	0	45	1.89	0.15
		Pre-recorded Zikr	10	19.30	12.20	0	36		
		Self zikr	10	33.50	37.19	0	91		
		Self-Talk	10	11.10	11.90	0	30		
	HF	Baseline	10	68.50	33.38	18	100	2.58	0.07
		Pre-recorded Zikr	10	54.30	29.52	9	100		
		Self zikr	10	36.40	39.65	0	100		
		Self-Talk	10	73.90	28.17	17	100		

Notes: *p<0.05*
AP = Acdemic Performance
GAP = Good Academic Performance
CS = Coherence Score

However, in the One Way ANOVA test for the LAP students shown in Table 4.8, it indicates that there was only a significant difference in the VLF (f=2.90, p=0.05), where the Self-Zikr was the highest mean value at 54.60±37.41, whereas, the Baseline protocol was the lowest mean value at 19.40±18.91.

Meanwhile, through the analysis shows in Table 4.8, which explains the comparison of VLF, LF and HF coherence score with the low academic performance (LAP) students. In the LF coherence score, the analysis yielded a *f*-ratios value of 1.04 which was not significant statistically at 0.39 (p<0.05). Besides that, the analysis of the HF coherence score was also not significant statistically at 0.07 (p<0.05) with the *f*-ratios value of 2.62. Table 4.8 indicates that the LAP students failed to implement and adapt the biofeedback training such as diaphragmatic breathing technique and reciting the zikr into their mind which has been proven could improve performance (Sutarto, Wahab & Zin, 2010; Sutarto, 2012; Senik & Wahab, 2013). It shows that the LAPS students failed to achieve a satisfied results in the given task (Vandellen et al., 2012).

Table 4.8: One Way ANOVA test for differences of VLF, LF and HF mean between protocols for Low Academic Performances (LAP).

AP	CS	Protocols	*n*	Mean	Std. Deviation	Minimum	Maximum	*f*	*p*
2=LAP	VLF	Baseline	10	19.40	18.91	0	52	2.90	0.05**
		Pre-recorded Zikr	10	41.50	24.51	15	92		
		Self zikr	10	54.60	37.41	6	100		
		Self-Talk	10	27.00	31.78	0	100		
	LF	Baseline	10	16.20	14.76	0	52	1.04	0.39
		Pre-recorded Zikr	10	15.80	6.30	8	27		
		Self zikr	10	28.00	29.01	0	100		
		Self-Talk	10	17.40	14.08	0	39		
	HF	Baseline	10	64.40	30.28	6	100	2.62	0.07
		Pre-recorded Zikr	10	42.70	26.75	0	76		
		Self zikr	10	25.70	33.48	0	97		
		Self-Talk	10	51.60	35.86	0	100		

** Significant p<0.05
AP = Acdemic Performance
LAP = Low academic performance
CS = Coherence Score

4.11 DIFFERENCES OF BASELINE, PRE-RECORDED ZIKR, SELF-ZIKR AND SELF-TALK USING THE TUKEY'S HSD POST-HOC TEST

From the analysis obtained in the One Way ANOVA results, it was indicated that only the VLF for low academic performance (LAP) was significantly difference in the protocols. Thus, the Tukey's HSD Post-hoc test was utilized to investigate the

differences between means of VLF coherence score and the protocols for the low academic performance (LAP) students. It was done to differentiate which protocols were significant statistically to the LAP students.

Table 4.9 explains on the relationship between the mean values of the VLF coherence score and the protocols. The analysis of the Tukey's post hoc test indicated that the VLF Coherene Score between the baseline and the Self Zikr protocol was significantly difference (Mean Difference = 35.20, p=0.01). Meanwhile, the VLF Coherence Score between Self-Talk and Self Zikr was also indicated significantly difference in the mean value (Mean Difference =27.60, p=0.04).

Table 4.9: The Tukey's HSD Post Hoc test for low academic performances (LAP)

AP	**CS**	**Protocols**		**Mean Difference**	***p***
2=LAP	VLF	Baseline	Self zikr	35.20	0.01**
		Self-Talk	Self zikr	27.60	0.04**

** Significant p<0.05
AP = Academic Performance
CS = Coherence Score

Overall, the Figure 4.5 illustrates the comparison of the mean values in the VLF coherence score among academic performance; between low and good academic performance students. In the VLF Coherence Score, low academic performance (LAP) indicated highest score of means (m=54.60) compared to the GAP (m=21.80) in the Self-Zikr protocols. Meanwhile, for the GAP students, the mean values for coherence score in the VLF for the Baseline (m=15.20), Pre-recorded Zikr (m=26.40), Self-Zikr (m=21.80) and Self-Talk (m=15.00) protocols was lower compared to the LAP students.

The results shows that in all protocols, the LAP students demonstrated higher coherence score in the VLF for Baseline (m=19.40), Pre-recorded Zikr (m=41.50), Self-Zikr (m =54.60) and Self-Talk (m=27.00) protocols compared to the GAP students. As a conclusion, these results indicated that the LAP students had been applying the parasympathetic nervous system which was shown by the higher coherence score in the VLF compared to the GAP students. Higher score in the VLF indicated less effort in finishing the given task. These results were consistent with the revious research which

stated that most of the non-self-regulated person will lose their interest or became lazy in finishing the difficult task (Vallerand & Bissonnette, 1992). Meanwhile a self-regulated person will put their full efforts and plan a strategy to achieve the targeted goal (Wang & Wu, 2008).

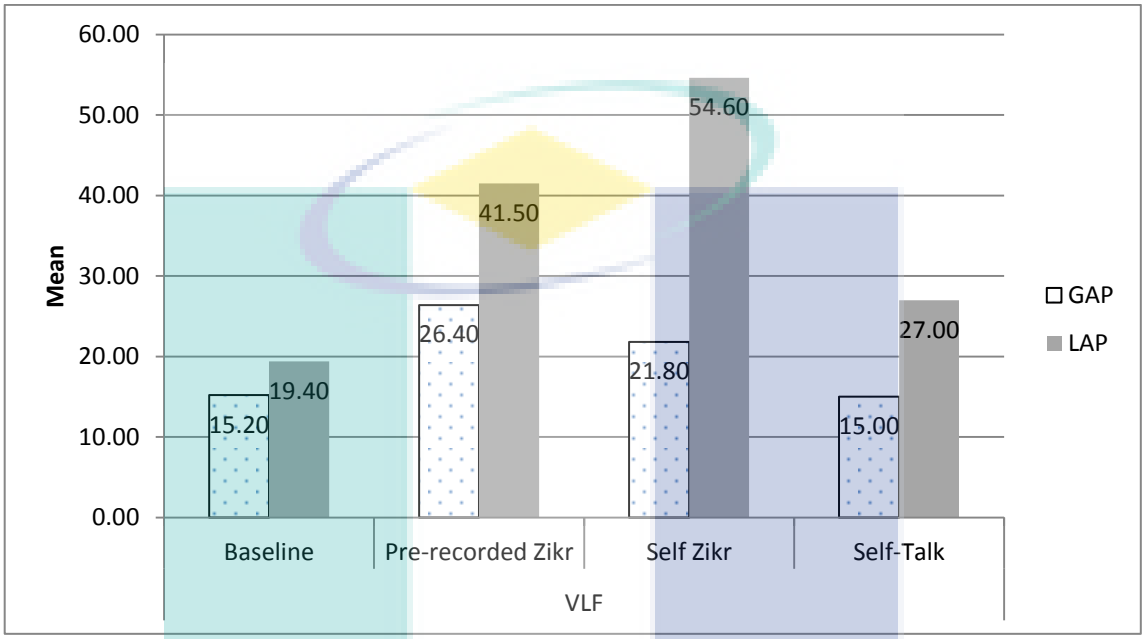


Figure 4.5: Comparison of mean values in the VLF among academic performances according to the protocols.

Meanwhile, Figure 4.6 illustrates the comparison of mean values in the LF coherence score among low and good academic performance according to the Baseline, Pre-recorded-Zikr, Self-Zikr and Self-Talk protocols. From the chart as follows, it was indicated that the good academic performance (GAP) had the highest score (m=73.90) compared to the low academic performance (LAP), (m=51.60) in the Self-Talk protocol. Besides that, the GAP students also demonstrated higher mean values in other protocols which were in the Baseline (m=68.50), Pre-recorded-Zikr (m=54.30) and Self-Zikr (m=36.40).

These higher coherence scores obtained in the LF for the GAP students were parallel with the previous study results on the implementation of slow or diaphragm breathing technique (Sutarto, 2012). This resonant frequency breathing with six breaths

per minute enhanced the emotional self control or regulation among samples (Thayer et al., 2010; Thayer & Lane, 2005). The ability to maintain the targeted coherence score explained their self-regulation during the protocols. This indicated that the GAP students had strong ability in self-regulation based on the targeted objectives of the clinical experiment. Wang and Wu (2008) in their research on self-regulation showed that a higher self regulated person implement strategies in order to posit good performance. Thus, in this clinical experimental's goal which directed the students to achieve the 100% LF coherence score was successfully met among the good academic performance.

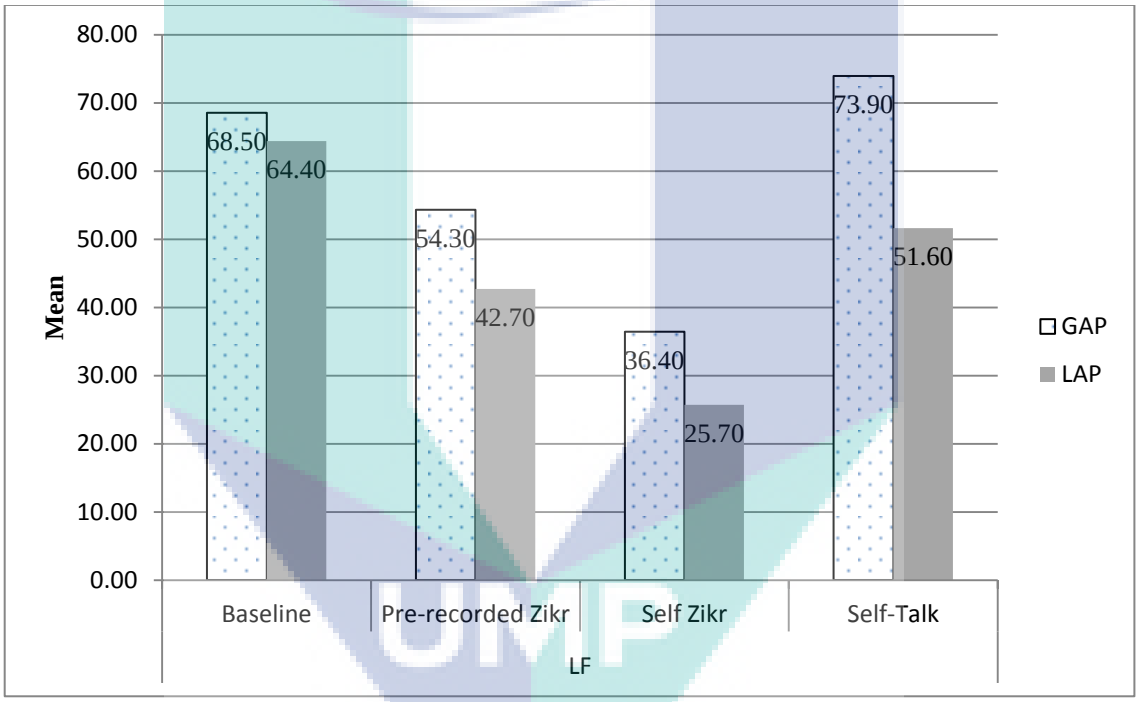


Figure 4.6: Comparison of mean values in the LF among academic performance according to the protocols.

Finally, the Figure 4.7 explains on the comparison of mean values in the HF Coherence Score among the good academic performance (GAP) and low academic performance (LAP). This chart indicates that the GAP students had the highest score (*m*=33.50) compared to the low academic performance (LAP), (*m*=28.00) in the Self-Zikr protocol. The GAP students also obtained the higher coherence score in the Baseline (*m*=16.30) compared to the LAP students (*m*=16.20). However, the differences

in the mean values for the Baseline were too small which was only 10% of 100 scores between the LAP and GAP students. In the Pre-recorded-Zikr protocol, the GAP students also gained the higher score (*m*=19.30) compared to the LAP students (*m*=15.80).

Meanwhile in the Self-Talk protocol, the LAP students have higher HF coherence score (*m*=17.40) compared to the GAP students (*m*=11.10).

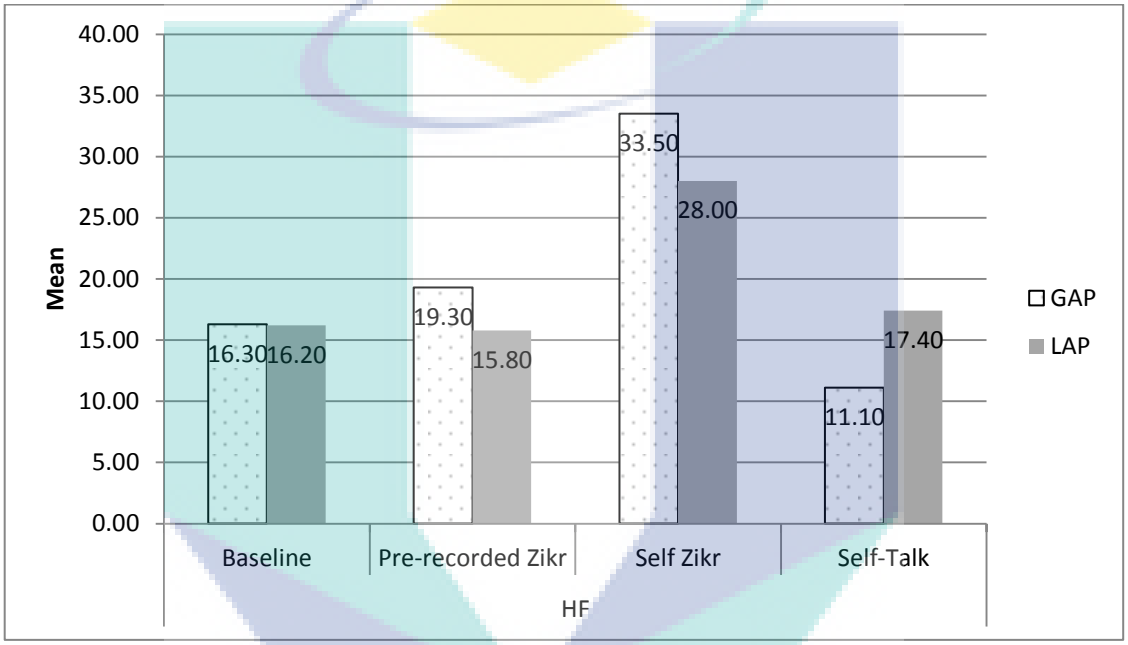


Figure 4.7: Comparison of mean values in the HF among academic performances according to the protocols.

As a summary, Chapter 4 was the results and findings of the research. It evaluates the relationship between academic performance and laziness among students. This section compared the coherence score in the HRV based on the protocols developed using the self-regulation stimulation script. The GAP students have succesfully demonstrates higher score in all protocols compared to the LAP students. They performed well in obtaining the LF score in the baseline, pre-recorded-zikr, self-zikr and self-talk protocols. A self-regulated person was reported capable and has the ability in controlling anxiety that directed to the increment in the performance and becoming successful (Zakaria et al., 2013; Klassen et al., 2008). The GAP students posit

higher concentration will lead to a good performance (Wilson et al., 2006). The person's intend affects his/her performance even when trying to maintain maximum effort (Latash & Jaric, 1998; Theodoraakis, Laparidis & Kioumourtzoglou, 1998).Moreover, Klassen et al., (2008) in their study on procrastination revealed that a procrastinating or lazy student has low grades in his/her academic performance due to lack of self-control.

However, the LAP students failed to achieve the target of the clinical experimental by having higher socres in the VLF. The higher scores in the VLF explains a normal breathing in the heart rate variability with 15 to 22 breaths per minute. Meanwhile the target in the clinical experimental was to achieve the 6 breaths per minute which illustrates in the LF scores. By utilizing the Mann Whitney *t-Test*, One Way ANOVA and Tukey's Post Hoc test, their scores in the VLF, LF and HF in different protocols have been quantified. The techniques being taught to increase the LF coherence score were the implementation of the slow/diaphragm breathing technique and reciting the zikr (Senik, & Wahab, 2013.). A study has approved that the self-regulated students have the ability to control effort in their way to achieve the targeted goals. Hence, they managed to achieve higher academic performance through goal orientation (Schapiro & Livingston, 2000). However, previous study showed that effort and commitment will arise together with the acceptance of a goal among individuals. Thus, this will affect the feedback and results on the goal performance (Lunenburg, 2011).

CHAPTER 5

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This section was divided into three sub-sections which are the discussion of the findings, the limitation and some suggestions for further research in the future. This study evaluated the relationship between laziness and HRV from 20 students at the age of 16 years old. In order to measure laziness, the self-regulation among students was being investigated through their ability in maintain and increase the coherence score at the targeted goal. By using the four protocols which were baseline, pre-recorded zikr, self-zikr and self-talk stimulation, the samples were evaluated for approximately 15 minutes during the clinical experiment. A study on laziness should be done from the psychophysiology perspectives using biofeedback as the mechanism to measure self-regulation among students. Thus, the biofeedback measurement could give a clear picture on the relationship between body and behavior which is closely related to the mind of a person.

5.2 CONCLUSIONS

Based on the results gathered from the clinical experiment, it was yielded that there were differences statistically on the HRV score between good academic performances (GAP) and low academic performances (LAP). This study had proven that GAP samples were capable in achieving the targeted goal compared to the LAP students. During the clinical experiment, they were being asked to achieve the 100% LF coherence score or the highest score as they could.

In details, the protocols in this study; baseline, pre-recorded zikr, self-zikr and self-talk were developed with difference levels of difficulties. The varieties of difficulties were purposely developed to evaluate their self-regulation in the clinical experimental. It was because a challenging and difficult task may reflect the initial motivation of the samples. Thus, a high level of inner motivation which is one of the criteria in self-regulation is an important element to achieve the targeted goal. The inner mortivation towards goal orientation impacted positively on the behaviour and performance among students. The ability in adapting the goal orientation in their behaviour is shown by the high academic achievers.

It was found that the highest achievement in LF coherence scores resulted from the good academic performance (GAP) students. The relationship between laziness and academic performance has a significant effect on self-regulation which is agreed by this study on laziness. It is because a low academic achiever has less expectation towards success, thus their effort was not fully utilized.

The increment in the LF coherence score results indicated that the GAP students achieved higher score in all protocols compared to the LAP students. The targeted goal which was the 100% LF coherence score had been achieved by the GAP students during the clinical experiment. Thus, the goal orientation had become a motivation in their performance that posits full efforts, persistence and attempts to finish the task successfully.

However, the anxiety towards performance among students would appear before and during the performance. In general, this anxiety involved a mind-body connection which explains an interaction between physical, behavior and mind. An anxious student has the physiological symptoms such as shortness in breathing, increment in heart rate, shaking, lack of confidence and stress. Thus, these physiological symptoms could be measured by investigating the frequencies of the heart rate.

According to anxiety towards performance related to goal orientation, it has been found that the LF coherence score for the GAP students was higher than the LAP students. It may due to the implementation of slow breathing technique, communication

and zikr recitation during the protocols. This indicated that the GAP students planned strategies to achieve the targeted goal by following the instructions to increase the LF coherence scores, which had been taught by the researcher before the experiment started.

Meanwhile, the LAP students demonstrated higher mean values in the VLF coherence score for all protocols. The LAP students had low commitment in achieving the 100% LF coherence score during the clinical experiment by posit lower coherence score in the LF compared to the GAP students. In other words, the LAP students posit laziness during the clinical experiment. However, the elements of concentration was positively shown by the GAP students who posits self-regulatory persistence towards given or targeted task. They were found to practice the diaphragm breathing technique by looking at their performance in the LF score where the score for LF increased compared to the LAP students. As a result, the GAP students achieved higher LF coherence score during the protocols.

However, academic performance is not a solid indicator of self-regulation among students. It also depends on the goal's acceptance and commitment within a person. In this study, it was found that the GAP students posit high commitment and gave full effort by investigating the good performance in the LF coherence score.

Despite from the psychology perspectives, the measurement of laziness or persistence was quantified and visualized through three frequencies of the heart rate variability which were the Very Low (VLF), Low (LF) and High frequency (HF) coherence score as shown as follows.

5.2.1 Very Low Frequency Coherence Score

During the clinical experiment, the LAP students had higher VLF coherence score in most of the protocols. The LAP students were reported to have higher score for VLF in all protocols except the Self-Talk protocol. The increment in the VLF coherence score among the LAP students indicated less self-regulation implementation during the clinical experiment. In order to become a self-regulated person, an inner motivation, in

terms of maintaining efforts and the use of strategies were important to succeed in the targeted goal.

One of the strategies to succeed in the targeted goal is concentration. Concentration means a person has the ability to focus at any intentional matter or task. Any internal or external stimulation will trigger emotion and thought that will affect the body response. The ability to focus on a given task, brings a meaning that a person could make a shield to him/herself from any external or internal distraction. Thus, his/her mind is in the present, not the past or in the future.

The strategies to maintain or increase the targeted coherence score in the LF had been taught to them before and during the clinical experiment. They were taught on the implementation of diaphragm breathing techniques while reciting the zikr "*La ilaha illallah*," that had been proven in the recent studies to improve performance.

Thus, due to the lack of self control among LAP students, they failed to achieve the targeted goal successfully. The lack of efforts and concentration that were being quantified through the coherence scores in the VLF were the indicator of their laziness. Physiologically, the increment in the VLF coherence score indicated the imbalance in the sympathetic and parasympathetic nerves system, involving the cardiovascular and respiratory activities. In depth, the imbalance in the nerves systems was closely related to the trait anxiety and stress according to the purpose of the clinical experiment which highlighted on the goal orientation. This goal orientation was automatically directed to a required achievement. Thus, the required and desired feedback in the biofeedback training gave pressure to the students. As a result, some of them experienced anxiety and stress.

Meanwhile, the GAP students had lower score in the VLF which was in contrast to the LAP students, in terms of self-regulation. As high or good achievers used less maladaptive behavior, they were easily giving up, putting less effort in finishing tasks and less inner motivation. As a conclusion, a non-self regulated person will fail to achieve highest score in the LF if they were not practicing the diaphragm breathing technique and reciting the zikr, in order to make them calm and concentrate on the

biofeedback training. Thus, the VLF coherence scores automatically became higher. This indicated that LAP students were lazy to achieve the targeted goal when they were involved in the difficult task and could not control their mind and body towards performance. The results evidenced that the LAP students decreased their self-regulation during the difficult task with the unsatisfied performance.

5.2.2 Low Frequency Coherence Score

Overall, the GAP students had demonstrated higher LF Coherence score in all protocols starting from the baseline, pre-recorded zikr, self-zikr and self-talk protocols. This indicated that the GAP experienced emotional stability where they demonstrated persistence and increased effort in the task performance.

From the biofeedback perspectives through heart rate variability (HRV), LF coherence score indicated that the samples experienced the balance in the sympathetic and parasympathetic nerves system and reached the 0.1 Hz. The breathing technique at the one's resonant frequency, normally at 6 breaths per minute will increase the LF coherence score.

Students who were intrinsically motivated will plan and try different strategy to achieve the goal by persisting with it. In this study, GAP demonstrated efforts in achieving the targeted goal by trying hard to reach the 100% LF coherence score during the clinical experiment. It had been proven that in all protocols, the GAP achieved higher LF score compared to LAP.

Furthermore, the LF coherence score indicated that the samples experienced the balance in the sympathetic and parasympathetic nerves system and reached the 0.1 Hz. The implementation of 6 breaths per minute and reciting *zikr*, the students would automatically reach the stability in the mind and body control. The stability of mind and body connection was quantified by investigating the increment of the LF coherence score during the protocols.

The increment in LF was related to the sympathetic cardiac control and a decrement in the parasympathetic control, sometimes involved both, as a sign of stress Although the GAP students were in a stressful condition, they managed to control it by showing their ability in achieving the targeted goal. The self-control behaviors of the GAP students demonstrated that good achievers in academic have higher persistence or motivation to finish the given task.

5.2.3 High Frequency Coherence Score

During the clinical experiment, the GAP students demonstrated higher HF coherence score in all except the Self-Talk protocols. The increments in HF have been reported might be due to some attentional task, mild stress, a cognitive reaction on orienting response. An active activity will make the HF coherence score decrease, which correlated to the decrement in RSA. Meanwhile in a passive activity, calmness will increase HF that described the increment in RSA.

The LAP students were reported to have higher HF coherence score which related to stress which explained the reduction in parasympathetic cardiac control. By practicing and implementing the diaphragmatic breathing technique and reciting the zikr, they became more calm and relaxed in finishing the targeted task.

5.3 IMPLICATIONS OF RESEARCH

In practice, by having a measurement of laziness from an analysis of heart rate variability, it could be a guideline to investigate people's level of self-regulation towards achievement. As a guideline, an authority in recruitment at any work places has some kind of decsription of a person's behavior. Thus, the measurement of laziness could contribute to the decision making process in any organisations. Hence, the developed self-regulation script to measure laziness could help improve motivation in the changes of cognition, affect and attitude towards personal goal attainment.

According to the theory of achievement goal, a non-self-regulated who failed to meet the target in the clinical experimental has low ability in self-regulating his/her self

towards success. Thus, to strengthen this self-monitoring within oneself, a person should have a clear picture on own's goal. By having goal in mind, a person should plan strategies to perform well by putting full effort, focus and try to avoid procrastination in daily activities.

Moreover, the implication of self-regulation within oneself has positive effects on the changes of their thoughts, attitudes and achievement. Thus, there would be changes in the mind-body connection which correlated to new perception of life, in terms of responsibility for oneself and surrounding.

5.4 RECOMMENDATIONS FOR FUTURE RESEARCH

From the findings in this study, it was yielded that self-regulation is an important element in one's self to increase the achievement of any goal orientation and mastering task. If the students really maintain, focus, put full efforts in achieving the targeted goal, they could control their laziness. The effect of achievement goal orientation and mastering task was assisted by the self-talk, reciting zikr and proper diaphragmatic breathing technique, helped to nurture the self-regulation. This self-control has significant impact on HRV data. The findings showed that HRV could become a benchmark in measuring laziness from the human psychophysiology perspectives. It monitored the relationship between, mind, behaviour and body in mobilizing the self-regulation among students.

In practice, the ability in self-regulation to overcome laziness, will drive a person to become more successful in their daily activities. Thus, an inner motivation could determine their mind and action towards goal orientation. This goal orientation finally will positively influence the achievement among individuals. Thus, research on laziness should be expanded in all areas of work place, in order to optimize the productivity in daily activities. Starting from toddlers, teenagers and adults, self-regulation among them should be nurtured naturally through guidance and practices everyday. The measurement of laziness could be a guideline in the recruitment of an organization, enhance self-regulation among individuals, developing leaders and producing energetic workers. Thus, further research need to be done in terms of

enhancing an investigation towards understanding the overall nature of laziness with the self-regulation.

Some recommendations on combining self-regulation elements with self-efficacy among students, ensuring the progress in the mind-body connection in a longer duration of assessment, bridging the process of self-control with academic performance and continuos training, in order to overcome laziness in the future. Mutual co-operation collectively between students, parents, school and society could enhance understanding on self-regulation within a person which would affect the education policy.

However, the results from the clinical experiment were an introductory to the measurement of laziness from the biofeedback training through heart rate variability judgment. There are some loops in the biofeedback training that could be enhanced in the future for mutual benefits. Loops in the time constraint, lack of training in the diaphragm breathing technique, implementation of an effective zikr during the clinical experiment and the preparedness to undergo experiment diligently were some of the gaps recognized in this study.

Thus, to develop a better biofeedback training, this study needs longer time to test their self-regulation through different kind of emotion or situation. Duration of the clinical experiment biofeedback training is crucial, in terms of effectiveness of the biofeedback training. A regular training within a month, for example, could develop self-regulation among students to overcome laziness. It will help them to control stress, emotion and this kind of self-regulation will lead them to success. Hence, some enhancement in implementation of biofeedback training could improve their ability in the goal orientation. Finally, it will nurture a new generation with strong willpower and are self-regulated towards achievement.

In some cases, although it is a stressful event, a self-regulated person managed to overcome it and successfully met the objectives or goals that have to be achieved. Thus, with a longer duration of the clinical experiment with interventions programs, laziness could be measured with huge influence in changing attitudes among students. Furthermore, the replicate of samples is one of the factors that could confirm the

validity and reliability of the biofeedback training through the protocols. A larger sample size will create complexity in data collection. However, the complexity is an important element to determine how accurate the biofeedback training using the developed protocols. Apart from that, a research from the qualitative perspective would be an added value to the clinical experiment. The feedback on the training verbally, will give more information on the effectiveness of the protocols, ideas to improve the training, problem occurred within samples and other factors that will enhance the presentation and implementation of the training to measure and finally overcome laziness.

As a summary, Chapter 5 is the conclusion, implications and recommendations of laziness from the psychophysiology perspectives. Recommendations in practice among students, policy maker, school, parents and society have a huge impact in the development of attitude within a person. Achievement goal as a benchmark to evaluate student's self-regulation towards any given task. As a conclusion, self-regulation is one of the most important elements to investigate laziness among students. The ability in controlling and maintaining efforts towards a given task or goal was the indicator of self-controlling. The element of self-control in self-regulation would be the main factor that could reduce or avoid laziness in daily activities. A person who could self-regulate towards achievement could be successful in managing life. Meanwhile a non self-regulated person failed to manage themselves towards success in any achievement or performance by having negative way of thinking, behavior and habits. Their laziness which is affected by lack of control in self-regulation will give negative impact towards achievement in daily activities. Thus, to overcome or reduce laziness, a person should become self-regulated by nurturing and developing motivation, efforts and try to finish any task until completed successfully.

REFERENCES

Adesope, O.O., Gress, L.Z. & Nesbit, J.C. (2008). Validating the Psychometric Properties of Achievement Goal Questionnaire using Item Response Theory. 2008 *Annual Meeting of the Canadian Society for the Study of Education.*Vancouver: 31 May-3 June.

Akselrod S.; Gordon, D.; Ubel, F; Shannon, D & Berger, A. (1981). Power spectrum analysis of heart rate fluctuation: a quantitative probe of beat-to-beat cardiovascular control. *Science.* (213): 220–222.

Ali, A. (1987). Scaling an Islamic Work Ethics. *The Journal of Social Psychology.* 128(5): 575–583.

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology.* (84): 261–271.

Araz, G. & Sungur, S. (2007). The interplay between cognitive and motivational variables in a problem-based learning environment. *Learning and Individual Differences.* (17): 291–297.

Arguelles, L.; McCraty, R. & Rees, R.A. *The Heart in Holistic Education* (online). http://www.entrepatients.net/sites/default/files/dossiers/heart-in-education.pdf (10 June 2013).

Babiloni, C.; Percio, C. D.; Iacoboni, M.; Infarinato, F.; Lizio, R. & Marzano, N. (2008). Golf putt outcomes are predicted by sensorimotor cerebral EEG rhythms. *Journal of Physiology*. 58(1): 131–139.

Bailon, R.; Mainardi, L.; Orini, M.; Sornmo, L. & Laguna, P. (2010). Analysis of heart rate variability during exercise stress testing using respiratory information. *Biomedical Signal Processing and Control.* (5): 299–310.

Bandura, A. (1994). *Self-efficacy*. Ramachandran V.S. (Ed.). New York: Academic Press.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: W. H. Freeman.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*. (52): 1–26.

Baumeister, R. F.; Bratslavsky, E.; Muraven, M. & Tice, D. M. (1998). Ego depletion: is the active self a limited resource? *Journal of personality and social psychology*. 74(5): 1252-1265.

Beck, J.W. & Schmidt, A.M. (2012). Taken out of context? Cross-level effects of between-person self efficay and difficulty on the within-person relationship of self-efficay with resource allocation. *Organization Behavior and Human Decision.* 119(2): 195-208.

Beghetto, R.A. (2007). Prospective teachers' beliefs about students' goal orientations: A carry-over effect of prior schooling experiences? *Social Psychology of Education*. 10(2): 171–191.

Bernardi, L.; Sleight, P.; Bandinelli, G.; Cencetti, S.; Fattorini, L.; Wdowczyc-Szulc, J.; & Lagi, A. (2001). Effect of rosary prayer and yoga mantras on autonomic cardiovascular rhythms: Comparative study. *British Medical Journal*. (323): 1446–1449.

Berntson, G.G. & Cacioppo, J. T. (2000). *Heart Rate Variability: Stress and Psychiatric Conditions* (online). http://psychology.uchicago.edu/people/faculty/cacioppo/jtcreprints/bc04.pdf . (15 May 2013).

Bidjari, A.F. (2011). Attitude and Social Representation. *Procedia Social and Behavioral Sciences*. (00): 1593–1597.

Blasquez, J.C.C.; Font, G.R. & Ortis, L.C. (2009). Heart-rate variability and precompetitive anxiety in swimmers. *Psicothema*. 21(4): 531-536.

Blunt, A.K. & Pychyl, T.A. (2000). Task aversiveness and procrastination: a multi-dimensional approach to task aversiveness across stages of personal projects. *Personality and Individual Differences*. (28): 153-167.

Bonaduce, D.; Petretta, M. & Marciano, F. (1999). Independent and incremental prognostic value of heart rate variability in patients with chronic heart failure. *American Heart Journal*. (138): 273–284.

Botkin, M. (1994). Olympic gold makes topping oh so sweet. *The 1984 Four Continents Rhythmic Sportive Gymnastics Championships Program*. Indianapolis: USGF.

Bradley, R.T.; McCraty, R.; Atkinson, M.; Tomasino, D.; Daugherty, A. & Arguelles, L. (2010). Emotion self-regulation, psychophysiological coherence, and test anxiety:

results from an experiment using electrophysiological measures. *Applied psychophysiology and biofeedback.* 35(4), 261–83.

Bradley, R.T.; Mccraty, R.; Atkinson, M.; Arguelles, L. & Rees, R.A. (2007). *Reducing Test Anxiety and Improving Summary of Results from the TestEdge National Demonstration Study* (online). http://www.essentia.fr/blog/wp-content/uploads/2011/10/Bradley-2007-Reducing-Test-anxiety-and-improving-test-performance-in-americs-schools.pdf (5 August 2012)

Brown, S.D.; Tramayne, S.; Hoxha, D.; Telander, K.; Fan, X. & Lent, R.W. (2008). Social cognitive predictors of college students' academic performance and persistence: A meta-analytic path analysis. *Journal of Vocational Behavior*. 72(3): 298–308.

Bunker, L.; Williams, J.M. & Zinsser, N. (1993). Cognitive techniques for improving performance and building confidence. *Applied sport psychology: Personal growth to peak performance*. 2(1): 225-242.

Burgio, K.L.; Whitehead, W.E. & Engel, B.T. (1985). Urinary incontinence in the elderlybladder-sphincter biofeedback and toileting skills training. *Annals of Internal Medicine.* 103(4): 507-515.

Byrnes, J.P. (2003). Factors predictive of mathematics achievement in White, Black and Hispanic 12th grades. *Journal of Educational Psychology*. (95): 316-326.

Carver, S.C. & Scheier, M.F. (2001a). Disengagement: Issues and Comparisons. *On the Self-Regulation of Behavior*. Cambridge: Cambridge University Press.

Carver, S.C. & Scheier, M.F. (2001b). *On the Self-Regulation of Behavior*. Cambridge: Cambridge University Press.

Calero, M. D.; García-Martín, M.B.; Jiménez, M.I.; Kazén, M. & Araque, A. (2007). Self-regulation advantage for high-IQ children: Findings from a research study. *Learning and Individual Differences*. 17(4): 328–343.

Campbell, T.S.; Lavoie, K.L.; Bacon, S.L.; Scharf, D.; Aboussafy, D. & Ditto, B. (2006). Asthma self-efficacy, high frequency heart rate variability, and airflow obstruction during negative affect in daily life. *International Journal of Psychophysiology. (*62): 109–114.

Cano, F.G. & Berben, A.B. (2009). University students' achievement goals and approaches to learning in mathematics. *The British journal of educational psychology*. 79(1): 131–53.

Cervantes Blasquez, J.C.; Rodas Font, G. & Capdevila Ortis, L. (2009). Heart-rate variability and precompetitive anxiety in swimmers. *Psicothema*. 21(4): 531–6 (online). http://www.ncbi.nlm.nih.gov/pubmed/19861094 (6 June 2013).

Chapra, G.V.; Fida, R.; Vecchione, M. & Del Bove, G. (2008). Longitudinal analysis of the role of perceived self-efficay for self-regulated learning in academic continuance and achievement. *Journal of Educational Psychology.* 100(3): 525-534.

Chazan, M; Davies, D.; Phillips, R. & Laing, A.F. (1998). *Helping socially withdrawn and isolate children and adolescents.* London: Cassell.

Choi, C.J.; Kim, K.S.; Kim, C.M.; Kim, S.H. & Choi, W.S. (2011). Reactivity of heart rate variability after exposure to colored lights in healthy adults with symptoms of anxiety and depression. *International journal of psychophysiology*. 79(2): 83–8.

Chen, J.A. & Usher, E.L. (2012). Profiles of the sources of science slf-efficacy. *Learning and Individual Differences.* (21): 281-287.

Cleary, T.J. (2006). The development and validation of the Self-Regulation Strategy Inventory-Self Report. *Journal of School Psychology*. (44): 307–322.

Clermont G, A.D. (2001). Towards understanding pathophysiology in critical care: the human body as a complex system. *Vincent J-L (ed.): Yearbook of Intensive Care and Emergency Medicine.* Berlin: Springer-Verlag. pp. 13–22.

Culbert, T.P.; Martin, H. & Mccraty, R. (2013). *A Practitioner's Guide to Applications of the emWave Desktop Stress Relief System.* Boulder Greek: Institute of HeartMath.

Cumming, S.P.; Smith, R.E.; Smoll, F.L.; Standage, M. & Grossbard, J.R. (2008). Development and validation of the Achievement Goal Scale for Youth Sports. *Psychology of Sport and Exercise*. 9(5): 686–703.

Cunningham, S. (1995). *Intrapersonal Communication Processes*. Aitken and Shedletsky (Eds.). Kansas City, University of Missouri.

Demos, J.N. (2005). *Getting Started with Neurofeedback.*. New York: W.W. Norton & Company, Inc.

De Rogalski Landrot, I.; Roche, F.; Pichot, V.; Teyssier, G.; Gaspoz, J.M.; Barthelemy, J.C. & Patural, H. (2007). Autonomic nervous system activity in premature and full-term infants from theoretical term to 7 years. *Autonomic Neuroscience:: Basic & Clinical*. 136(1-2): 105–109.

Dekker, J.M; de Vries, E.L.; Lengton, R.R., et al. (1996). Reproducibility and comparability of short and long-term heart rate variability measures in healthy young men. *Ann Noninvasive Electrocardiol*. (1): 287-197.

Dewitte, S. & Schouwenburg, H.C. (2002). Procrastination, temptations, and incentives: The struggle between the present and the future in procrastinators and the punctual. *European Journal of Personality*. (16): 469–489.

Diamond, G.; Siqueland, L. & Diamond, G.M. (2003). Attachment-based family therapy for depressed adolescents: programmatic treatment development. *Clinical child and family psychology review.* 6(2): 107–127 (online). http://www.ncbi.nlm.nih.gov/pubmed/12836580 (4 July 2013).

Diseth, A. (2011). Self-efficacy, goal orientations and learning strategies as mediators between preceding and subsequent academic achievement. *Learning and Individual Differences.* 21(2): 191–195.

Duru, E. & Balkis. M. (2014). The Roles of Academic Procrastination Tendency on the Relationships among Self Doubt, Self Esteem and Academic Achievement. *Education and Science.* 39(173): 274–287.

Dweck, C.S. & Leggets, E.L. (1988). A social-cognitie approach to motivation and personality. *Psychological Review.* (94): 256-273.

Elliot, A.J. (1999). Approach and avoidance motivation and achivement goals. *Educational Psychologist.* 34(3): 169-189.

Elliot, A. J. (2006). The hierarchical model of approach-avoidance motivation. *Motivation and Emotion.* (30): 111–116.

Elliot, A.J. & Church, M.A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Pscychology.* 71(1): 218-232.

Elliot, A. J. & Murayama, K. (2008). On the measurement of achievement goals: Critique, illustration, and application. *Journal of Educational Psychology*. (100): 613–628.

Ellis, A. (1991). *Using rational-emotive theraphy effectively: A practioner's guide.* M.E. Bernard (Ed.). New York: Plenum Press.

Elci, M.; Sener, I. & Alpkan, L. (2011). The Impact of Morality and Religiosity of Employees on Their Hardworking Behavior. *Procedia - Social and Behavioral Sciences*. (24): 1367–1377.

Ferrari, J. (2001). Procrastination as Self-regulation Failure of Performance: Effects of Cognitive Load, Sef-Awareness and Time Limits on Working Best Under Pressure. *European Journal of Personality. (*15): 391-406.

Ferrari, J. (1992). Procrastination in the workplace: Attributions for failure among individuals with similar behavioral tendencies. *Personality and Individual Differences.* 13(3): 315– 319.

Finney, S.J.; Pieper, S.L. & Barron, K.E. (2004). Examining the Psychometric Properties of the Achievement Goal Questionnaire in a General Academic Context. *Educational and Psychological Measurement*. 64(2): 365–382.

Gammage, K.L.; Hardy, J. & Hall, C.R. (2001). A description of self-talk in exercise. *Psychology of Sport and Exercise*. 2(4): 233–247.

Gatchel, R.J.; Robinson, R.C.; Pulliam, C. & Maddrey, A.M. (2003). Biofeedback With Pain Patients : Evidence for Its Effectiveness. *Seminars in Pain Medicine. (*1):2.

German-Sallo, Z. (2014). Wavelet Transform based HRV Analysis. *Procedia Technology*. (12): 105–111.

Gilman, R. & Anderman, E.M. (2006). The relationship between relative levels of motivation and intrapersonal, interpersonal, and academic functioning among older adolescents. *Journal of School Psychology.* 44(5): 375–391.

Givvin, K.B.; Stipek, D.J.; Salmon, J.M. & Macgyvers, V.L. (2001). In the eyes of the beholder : students ' and teachers ' judgments of students ' motivation. *Teaching and Teacher Education.* (17): 321-331.

Good, T.L. & Brophy, J.E. (2000). *Looking in classrooms* (8th ed.). New York: Longman.

Green, E.E.; Green, A.M. & Walters, E.D. (1970). Voluntary Control of Internal States Phychological and Physiological. *Subtle Energies & Energy Medicine.* 10(2): 71-88.

Hager, T.; Maroteaux, G.; Pont, P.D.; Julsing, J.; van Vliet, R. & Stiedl, O. (2014). Munc18-1 haploinsufficiency results in enhanced anxiety-like behavior as determined by heart rate responses in mice. *Behavioural brain research*. (260): 44–52.

Hansson, M. & Jonsson, P. (2006). Estimation of HRV spectrogram using multiple window methods focussing on the high frequency power. *Medical engineering & physics*. 28(8): 749–761.

Harackiewicz, J.M.; Barron, K.E. & Elliot, A.J. (1998). Rethinking achievement goals: When are they adaptive for college students and why? *Educatioal Psychologist*. 33(1): 1-21.

Hardy, J.; Gammage, K. & Hall, C. (2001). A descriptive study of athlete self-talk. *Sport Psychologist*. 15(3): 306-318.

Harris, H.L. & Coy, H.R. (2003). Helping students cope with test anxiety. *ERIC Digest.* Washington: Office of Educational Research and Improvement (ED)

Hassett, A.L.; Radvanski, D.C.; Vaschillo, E.G.; Vaschillo, B.; Sigal, L.H. & Karavidas, M.K. (2007). A pilot study of the efficacy of heart rate variability (HRV) biofeedback in patients with fibromyalgia. *Applied Psychophysiology Biofeedback.* (32): 1–10.

Hohl Radke F. & Lundershausen, C. (2010). Heart rate variability and "Antrieb" (drive, impulse): Association between a psychopat hological sign and the autonomic nervous system's state in depressive patients. *Schweizer Archiv Fur Neurologie Und Psychiatrie.* 161(5): 173–177.

Horgan, J. (1993). Does the brain have a supreme integrator? *Scientific American,* Dec: 269(6):6-7.

Howarth, C.; Fosters, J. & Dorrer, N. (2004). Exploring the potential of the theory of social representations in community based health research. *Journal of Health Psychology.* (9): 229–243.

Howell, A. J. & Buro, K. (2009). Implicit beliefs, achievement goals, and procrastination : A mediational analysis. *Learning and Individual Differences*. 19(1): 151–154.

Howell, A.J. & Watson, D.C. (2007). Procrastination: Associations with achievement goal orientation and learning strategies. *Personality and Individual Differences.* 43(1): 167-178.

Huang-Storms, L.; Bodenhamer-Davis, E.; Davis, R. & Dunn, J. (2007) QEEG-Guided Neurofeedback for Chidren with Histories of Abuse and neglect: Neurodevelopment rationale and Pilot Study. *Journal of Neurotherapy: Investigations in Neuromodulation, Neurofeedback and Applied Neuroscience.* 10(4): 3-16.

Hussain, I. & Sultan, S. (2010). Analysis of procrastination among university students. *Procedia - Social and Behavioral Sciences.* (5): 1897–1904.

Hynynen, E.; Konttinen, N.; Kinnunen, U.; Kyrolainen, H. & Rusko, H. (2011). The incidence of stress symptoms and heart rate variability during sleep and orthostatic test. *European journal of applied physiology*. 111(5): 733–741.

Izadikhah, Z.; Jackson, C.J. & Loxton, N. (2010). An integrative approach to personality : Behavioural Approach System , mastery approach orientation and environmental cues in the prediction of work performance. *Personality and Individual Differences.* 48(5): 590–595.

Jang, L.Y. & Liu, W.C. (2011). 2 × 2 Achievement goals and achievement emotions: a cluster analysis of students' motivation. *European Journal of Psychology of Education.* 27(1): 59–76.

Johnson, D.N.; McGrath, A. & Mcneil, C. (2002). Cuing Interacts with Perceptual Load in Visual Search. *Psychological Science.* 13(3): 284-287.

Joinson, A.N. (2007). Self-Esteem, Interpersonal Risk and Preference for E-Mail to Face-To Face Communication. *CyberPsychology & Behavior.* 7(4): 472-478.

Kajander, R. & Peper, E. (1998). Teaching diaphragmatic breathing to children. *Biofeedback*, 26(3): 14–17.

Kharrazi, A. & Kareshki, H. (2010). Environmental perceptions, motivational beliefs and self-regulating learning by Iranian high school students. *Procedia Social and Behavioral Sciences*. (5): 2160-2164.

Khezri, H.; Lavasani, M.G.; Malahmadi, E. & Amani, J. (2010). The role of self-efficacy , task value, and achievement goals in predicting learning approaches and mathematics achievement. *Procedia Social and Behavioral Sciences. (*5):942–947.

Klassen, R.M.; Krawchuk, L.L. & Rajani, S. (2008). Academic procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of procrastination. *Contemporary Educational Psychology*. 33(4): 915–931.

Kleiger, R.E.; Miller, J.P. & Bigger Jr, J.T. (1987). Decreased heart rate variability and its association with increased mortality after acute myocardial infarction. *Am J Cardiol*. (59): 256–262.

Kolovelonis, A.; Goudas, M. & Dermitzaki, I. (2011). The effects of instructional and motivational self-talk on students motor task performance in physical education. *Psychology of Sport and Exercise.* 12(2): 153-158.

Kong, C.K. & Hau, K.T. (1996). Students' achievement goals and approach to learning: The relationship between empahsis on self-improvement and approach understanding. *Research in Education. (*55): 74-85.

Kreibig, S.D. (2010). Autonomic nervous system activity in emotion: a review. *Biological psychology*. 84(3): 394–421.

Kuhl, J. & Kraska, K. (1993). Self-regulation: Psychometric properties of a computer-aided instrument. *German Journal of Psychology*. 71(1): 11-24.

Laborde, S.; Brull, A., Weber, J. & Sophie, L. (2011). Trait emotional intelligence in sports : A protective role against stress through heart rate variability? *Personality and Individual Differences*. 51(1): 23–27.

Lagos, L.; Vaschillo, E.; Vaschillo, B.; Lehrer, P.; Bates, M. & Pandina, R. (2008). Heart rate variability biofeedback for dealing with competitive anxiety: A case study. *Applied Psychophysiology and Biofeedback.* 36(3): 109–115.

Larson, W. (2000). Toward a Psychology of Positive Youth Development. *American Psychologist.* 55(1): 170–183.

Latash, M. & Jaric, S. (1998). Instruction-dependent muscle activation patterns within a two-joint synergy: Separating mechanis from neurophysiology. *Journal of Motor Behaviour.* (30): 194–198.

Lavasani, M.G.; Mirhosseini, F.S.; Hejazi, E. & Davoodi, M. (2011). The Effect of Self-regulation Learning Strategies Training on the Academic Motivation and Self-efficacy. *Procedia - Social and Behavioral Sciences*. (29): 627–632.

Lehrer, P.M.; Vaschillo, E.G. & Vaschillo, B. (2000). Resonant Frequency Biofeedback Training to Increase Cardiac Variability: Rationale and Manual for Training. *Applied Psychophysiology and Biofeedback*. 25(3): 177–191.

Lunenburg, F.C. (2011). Goal-Setting Theory of Motivation. *International of Management, Business, and Administration.* 15(1): 1–6.

Luszczynska, A. & Schwarzer, R. (2005). The General Self-Efficacy Scale: Multicultural Validation Studies. *The Journal of Psychology.* 139(5):439–457.

Madgar, N.; Kaplan, A. & Weinstock, M. (2011). Clarifying mastery-avoidance goals in high school: Distiguishing between intrapersonal and task-based standards of competence. *Contemporary Educational Psychology*. 36(4): 268-279.

Marijon, E.; Boveda, S.; Chevalier, P.; Bulava, A.; Winter, J.B.; Lambiez, M. & Defaye, P. (2008). Monitoring of heart rate variability in heart failure patients with cardiac resynchronisation therapy : Interest of continuous and didactic algorithm. *International Journal of Cardiology*. 144(1): 166–169.

McGregor, H.A. & Elliot, A. (2002). Achievement goals as predictors of achievement-relevant processor prior to task engagement. *Journal of Educational Psychology*. (94): 381–395.

Mccloskey, J.D. (2011). *Finally My Thesis on Procrastination*. Ph.D Thesis. The University of Texas Arlington, USA.

Mccraty, R. (2005). *Enhancing Emotional , Social , and Academic Learning With Heart Rhythm Coherence Feedback. Psychophysiological Coherence.* U.K.: Institute of HeartMath.

Mccraty, R.; Atkinson, M.; Tomasino, D. & Bradley, R.T. (2009). The Coherent Heart Heart – Brain Interactions, Psychophysiological Coherence and the Emergence of System-Wide Order. *Integral review.* 5(2): 10-114.

Mccraty, R.; Atkinson, M. & Tamasino, D. (2001). *Science of the heart: Exploring the Role of the Heart in Human Performance*. Boulder Greek: Institute of HeartMath.

Meece, J.L.; Anderman, E.L. & Anderman, L.H. (2006). Classroom goal structure, student motivation, and academic achievement. *American Review of Psychology*. (57): 487–503.

Michinov, N.; Brunot, S.; Le Bohec, O.; Juhel, J. & Delaval, M. (2011). Procrastination, participation, and performance in online learning environments. *Computers & Education*. 56(1): 243–252.

Milgram, M. (1991). *Encyclopedia Of Human Biology.* D. R. (Ed.). New York: Academic Press.

Mirza W. Ahmed, M.D.; Kadish A.H.; Parker, M.A. & Goldberger, J.J. (1994). Effect of physiologic and pharmacologic adrenergic stimulation on heart rate variability. *Journal of American College of Cardiology*. (24): 1082-1090.

Mish, F. (1994). *Merriam Webster's Collegiate Dictionary* (10th ed.). New York: Merriam- Webster.

Molgaard, H. & Sorensen, K.E. (1991). Attenuated 24-h heart rate variability in apparently healthy subjects, subsequently suffering sudden cardiac death. *Clin Auton Res.* (1): 233–237.

Moss, D. & Shaffer, F. (2003). *Heart Rate Variability Training* (online). http://www.biofeedbacksweden.com/articles/hrv.pdf (5 October 2012).

Motie, H.; Heidari, M. & Alsadat, M. (2012). Predicting Academic Procrastination during Self-Regulated Learning in Iranian first Grade High School Students. *Procedia - Social and Behavioral Sciences*. 69(2012): 2299–2308.

Neenan, M. (2008). Tackling Procrastination: An REBT Perspective for Coaches. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*. 26(1): 53–62.

Ning, H.K. & Downing, K. (2010). The reciprocal relationship between motivation and self-regulation: A longitudinal study on academic performance. *Learning and Individual Differences.* 20(6): 682-686.

Olson, J.M. & Maio, G.R. (2003). *Handbook of Psychology.* USA: John Wiley & Sons.

O'Sullivan, T.; Hartley, J.; Saunders, D. & Fiske, J. (1983). *Key concepts in communication*. London: Methuen.

Owen, H.D. (2004). *Skilled Interpersonal Communication: Research, Theory and Practice*. New York: Routledge Taylor & Francis Group.

Owen, H.D. (2004). *The Handbook of Communication Skills*. 2nd ed. New York: Routledge.

Papaioannou, V.E. (2007). Heart rate variability, baroreflex function and heart rate turbulence: possible origin and implications. *Hellenic journal of cardiology : HJC = Hellēnikē kardiologikē epitheōrēsē*. 48(5): 278–89 (online). http://www.ncbi.nlm.nih.gov/pubmed/17966683 (22 September 2013).

Patel, H. & Catherine, G. (2008). *Respiratory System*. Daniel, H.S. (Ed.). Philadelphia: Elsevier Ltd.

Paul, M. & Garg, K. (2012). The effect of heart rate variability biofeedback on performance psychology of basketball players. *Applied psychophysiology and biofeedback*. 37(2): 131–44.

Paul, G.; Elam, B & Verhulst, S.J. (2007). A longitudinal study of students' perceptions of using deep breathing meditation to reduce testing stresses. *Teaching and learning in medicine.* 19(3): 287-292.

Paulsen, E.; Bru, E. & Murberg, T.A. (2006). Passive Students in Junior High School: The Associations with Shyness, Perceived Competence and Social Support. *Social Psychology of Education*. 9(1): 67–81.

Pekrun, R.; Elliot, A.J. & Maier, M.A. (2009). Achievement goals and achievement emotions:Testing amodel of their joint relations with academic performance. *Journal of Educational Psychology.* (101): 115–135.

Pekrun, R.; Goetz, T.; Titz, W. & Perry, R.P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of quantitative and qualitative research. *Educational Psychologist*. (37): 91– 106.

Peper, E. (1998). Teaching Diaphragmatic Breathing to Children. *Biofeedback.* 26(3): 14–17.

Peper, E.; Gibney, K.H. & Wilson, V.E. (2004). Group training with Health Computing Practices to Prevent Repetitive Strain Injuru (RSI): A Preliminary Study. *Applied Psychophysiology and Biofeedback.* 29(4): 279-280.

Peper, E.; Harvey, R. & Takabayashi, N. (2009). Biofeedback in practice Biofeedback an evidence based approach in clinical practice. *Japanese Journal of Biofeedback research.* 36(1): 3–10.

Peper, E.; Shumay, D.M.; Moss, D. & Sztembis, R. (2013). The Power of Words, Biofeedback, and Somatic Feedback to Impact Illness Beliefs. *Somatics* (In Press). pp. 1–9.

Perry, N.E.; Hutchinson, L. & Thauberger, C. (2008). Talking about teaching self-regulated learning: Scaffolfing student teachers development and ue of practices that promote self-regulated learning. *International Journal Education Research*. (47): 97-108.

Peper, E. & Tibbitts, V. (2003). *Clinical Practice of Biofeedback*. Zheng, Y. (Ed.). Beijing: High Education Press (HEP).

Pintrich, P.R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research*. 31(6): 459-470.

Pintrich, P.R. (2000). *Handbook of self-regulation*. P. P. M. B. S (Ed.). New York: Academic Press.

Pokay, P. & Blumenfeld, P.C. (1990). Predicting achievement early and late in the semester: The role of motivation and use of learning strategies. *Journal of Educational Psychology. (*82): 41-50.

Pomeranz, R.; Macaulay, J.; Caudill M.A.; Kutz, I.; Adam, D.; Gordon, D.; Kilborn, K.M.; Barger, A.C.; Shannon, D.C. & Cohen, R.J. (1985). Assessment of autonomic function in humans by heart rate spectral analysis. *AmJ Physiol Heart Circ Physiol*. (248): 151–153.

Prima, V.M. (2010). The Relationship between Study Anxiety and Academic. *Procedia Social and Behavioral Sciences.* (8): 490–497.

Pumprla, J.; Howorka, K.; Groves, D.; Chester, M. & Nolan, J. (2002). Functional assessment of heart rate variability: physiological basis and practical applications. *International journal of cardiology*. 84(1): 1–14 (online). http://www.ncbi.nlm.nih.gov/pubmed/12104056 (9 October 2012).

Pychyl, T.A. & Flett, G.L. (2012). Procrastion and Self-Regulation Failure: An Introduction to the Special Case. *Journal of Rational Emotive & Cognitive Behavior Theraphy.* 30(4): 203-212.

Qi, J.; Mcinerney, D.M.; Arief, G.; Liem, D. & Ortiga, Y.P. (2010). The relationship between future goals and achievement goal orientations : An intrinsic – extrinsic motivation perspective. *Contemporary Educational Psychology*. 35(4): 264–279.

Quigley, K.S. & Berntson, G.G. (1990). Autonomic origins of cardiac responses to non-signal stimuli in the rat. *Behavioural Neuroscience*. (104): 751–762.

Ramsay, D. & Lewis, M. (2003). Reactivity and Regulation in Cortisol and Behavioral Responses to Stress. *Child Development*. 74(2): 456-464.

Reyna, C. (2000). Lazy, Dumb, or Industrious: When Stereotypes Convey Attribution Information in the Classroom. *Educational. Psychology Review*. 12(1): 85–110.

Ridder, D.T.D.; Boer, B.J.D.; Lugtig, P.; Bakker, A.B. & Van Hooft, E.A.J. (2011). Not doing bad things is not equivalent to doing the right thing: Distinguishing between inhibitory and initiatory self-control. *Personality and Individual Differences.* 50(7): 1006–1011.

Stern, R.M.; Ray, W.J. & Quigley, K.S. (2001). *Psychophysiological Recording*. New York: Oxford University Press, Inc.

Ruffin, P. (2007). A real fear. *Diverse Issues in Higher Education*. 24(2): 17–19.

Robbins, J. (2001). Communication and Linguistic Ideology. *Current Anthropology*. 42(5): 591-614.

Ryan, R.M. & Deci, E.L. (2000). Intrinsic and extrinsic motivations: classic definition and new directions. *Contemporary Educational Psychology*. (25): 54–67.

Saini, B.S.; Singh, D.; Uddin, M. & Kumar, V. (2009). Improved Power Spectrum Estimation for RR-Interval Time Series. *International Journal of Electrical and Computer Engineering.* 4(3): 194–198.

Salta, K. & Tzougraki, C. (2004). Attitudes towards chemistry Among 11th Grade Students in High Schools in Greece. *Science Education*. (88): 535–547.

Sayers, B.M. (1973). Analysis of heart rate variability. *Ergonomics*. (16): 17–32.

Schafer, A. & Vagedes, J. (2012). How accurate is pulse rate variability as an estimate of heart rate variability?: A review on studies comparing photoplethysmographic

technology with an electrocardiogram. *International Journal of Cardiology* (In Press). pp. 1-15.

Schapiro, S.R. & Livingston, J.A. (2000). Dynamic Self-Regulation : The Driving Force Behind Academic Achievement. *Innovative Higher Education.* 25(1): 23–35.

Schlindwein, P.; Buchholz, H.G.; Schreckenberger, M.; Bartenstein, P.; Dieterich, M. & Birklein, F. (2008). Sympathetic activity at rest and motor brain areas: FDG-PET study. *Autonomic Neuroscience : Basic & Clinical*. 143(1-2): 27–32.

Schouwenburg, H.C. & Lay, C.H. (1995). Trait procrastination and the Big-five factors of personality. *Personality and Individual Differences*. 18(4): 481–490.

Schraw, G.; Wadkins, T. & Olafson, L. (2007). Doing the things we do: A grounded theory of academic procrastination. *Journal of Educational Psychology*. 99(1): 12–25.

Schroeder, E.B.; Whitsel, E.A.; Evans, G.W.; Prineas, R.J.; Chambless, L.E. & Heiss, G. (2004). Repeatability of heart rate variability measures. *Journal of Electrocardiology*. 37(3): 163–172.

Schunk, D.H. (1995). *Self-efficacy, adaptation and adjustment: Theory, research and application.* Maddux, E. (Ed.). New York: Plenum Press.

Schunk, F.D. & Zimmerman, H.B. (2007). *Motivation and Self-Regulated Learning: Theory, Research and Applications.*New York: Lawrence Erlbaum Associate.

Schutz, P.A. & Pekrun, R. (2007). *Emotion in education.* San Diego, CA: Academic Press.

Schwartz M.N. & Schwartz, S.M. (2003). *Biofeedback: A Practitioner's Guide.* Schwartz, M. and Andrasik, F. (Ed.). New York: The Guilford Press.

Schwartz, R.G. & Goffman, L. (1995). Metrical patterns of words and production accuracy. *Journal of Speech, Language, and Hearing Research.* 38(4): 876-888.

Senik, M.R. & Abdul Wahab, M.N. (2013). A pilot study of the effect of zikir on the performance psychology using heart rate variability (hrv). *Proceeding of tthe 4th International Graduate Conference on Engineering, Science and Humanities (ICGESH) 2013*. pp. 1047–1050.

Seo, M. & Ilies, R. (2009). The role of self-efficacy, goal, and affect in dynamic motivational self-regulation. *Organizational Behavior and Human Decision Processes*. 109(2): 120–133.

Shah, A.S. (2000). *Exploring the World of English: A Practical Course in Composition*. Lahore: Markazi Kutub Khana.

Shahidi, S & Salmon, P. (1992). Contingent and non-contingent biofeedback training for Type A and B healthy adults: Can type as relax by competing? *Journal of Psychosomatic Research. (*36): 477-483.

Shields, R.W. (2009). Heart rate variability with deep breathing as a clinical test of cardiovagal function. *Cleveland Clinic Journal of Medicine*. 76(2): 37–40.

Siegel, M.A. & Ranney, M.A. (2003). Developing the Changes in Attitude about the Relevance of Science (CARS) Questionnaire and Assessing Two High School Classes. *Journal of Research in Science Teaching*. 40(8): 757–775.

Simons, J.; Vansteenkiste, M. & Lens, W. (2004). Placing motivation and future time perspective theory a temporal perspective. *Educational Psychology Review. (*16): 121-139.

Simpson, R. & Oliver, J. (1990). A summary of major influences on attitude toward an achievement in science among adolescent students. *Science Education*. (74): 1-18.

Smith, M.J. (1992). *Persuasion and human action: A review and critique of social influence theories*. California: Wadsworth Publishing Company.

Solomon, L. & Rothblum, E. (1984). Academic Procrastination: Frequency and Cognitive-Behavioural Correlates. *Journal of Counseling Psychology. (*31): 504-510.

Smolders, K.C.H.; De Kort, Y.A.W. & Cluitmans, P.J.M. (2012). A higher illuminance induces alertness even during office hours: findings on subjective measures, task performance and heart rate measures. *Physiology & Behavior*. 107(1): 7–16.

Sommer, L. (2013). Exam preparation: The influence of action control, procrastination and examination experience on students' goal intention and implementation intention. *Electronic Journal of Research in Education Psychology*. 11(3): 603-630.

Song, Z. & Chon, K. (2012). Hospitality Management General self-efficacy's effect on Career choice goals via vocational interests and person-job fit: A mediation model. *International Journal of Hospitality Management.* 31(3): 798-808.

Spalding, T.W.; Lyon, L.A.; Steel, D.H. & Hatfield, B.D. (2004). Aerobic exercise training and cardiovascular reactivity to psychological stress in sedentary young normotensive men and women. *Psychophysiology.* 41(4): 552-562.

Stead, R.; Shanahan, M.J. & Neufeld, R.W.J. (2010). "I'll go to therapy, eventually": Procrastination, stress and mental health. *Personality and Individual Differences.* 49(3): 175–180.

Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*. (133)**:** 65–94.

Steel, P. (2008). *Procrastination History* (online). http://www.procrastinus–history.htm access. (13 February 2013).

Stern, R.M.; Ray, W.J. & Quigley, K.S. (2001). *Psychological Recording.* New York: University Press, Inc.

Stoeber, J.; Stoll, O.; Pescheck, E. & Otto, K. (2008). Perfectionism and achievement goals in athletes : Relations with approach and avoidance orientations in mastery and performance goals.*Psychology of Sport nd Exercise.* (9): 102–121.

Sutarto, A.P. (2012). *The Effect of Heart Rate Variability Biofeedback Training for Improving Cognitive Performance Among Female Manufacturing Operators*. Ph.D Thesis. Universiti Malaysia Pahang, Malaysia.

Sutarto, A.P.; Abdul Wahab, M.N. & Zain. N. (2010). Heart rate variability (HRV) biofeedback: A new training approach for operator's performance enhancement. *Journal of Industrial Engineering and Management.* 3(1): 176–198.

Tanis, C.J. (2008). *The Effects of Heart Rhythm Variability Biofeedback With Emotional Regulation on the Athletic Performance Collegiate Volleyball Players.* Ph.D Thesis. Capella University, USA.

Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology. (1996a). Heart rate variability: standards of measurement, physiological interpretation and clinical use. *Circulation*. (93): 1043–1065.

Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology. 1996b. Heart rate variability: Standards of measurement, physiological interpretation, and clinical use. *European Heart Journal*. (17): 354–381.

Thayer, J.B. (2005). Psychosomatics and psychopathology: looking up and down from the brain. *Psychoneuroendocrinology*. (30): 1050–1058.

Thayer, J.F.; Yamamoto, S.S. & Brosschot, J.F. (2010). The relationship of autonomic imbalance, heart rate variability and cardiovascular disease risk factors. *International Journal of Cardiology*. 141(2): 122–31.

Theodorakis, Y.; Laparidis, K. & Kioumourtzoglou, E. (1998). Combined effects of goal setting and performance feedback on performance and physiological response on a maximum effort task. *Perceptual and Motor Skills*. (86): 1035–1041.

Thurber, M.R. (2006). *Effects of Heart-Rate Variability Biofeedback Training and Emotional Regulation on Music Performance Anxiety in University Students*. Ph.D Thesis. University of North Texas, USA.

Thurber, M.R.; Bodenhamer-Davis, E.; Johnson, M.; Chesky, K. & Chandler, C.K. (2010). Effects of Heart Rate Variability Coherence Biofeedback Training and Emotional Management Techniques to Decrease Music Performance Anxiety. *Biofeedback*. 38(1): 28-40.

Tice, D. & Baumeister, R. (1997). Longitudinal study of procrastination, performance, stress and health: the costs and benefits of dawdling. *Psychological Science. (*8): 445-454.

Trumper, R. (2006). Factors Affecting Junior High School Students' Interest in Physics. *Journal of Science Education and Technology*. 15(1): 47–58.

Urdan, T. (1997). *Advances in motivation and achievement*. M. M. P. P. (Eds.). Greenwich: JAI.

Vallerand, R.J. & Bissonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: a prospective study. *Journal of Personality*. (60): 599–620.

Vandellen, M.R.; Hoyle, R.H. & Miller, R. (2012). The Regulatory Easy Street: Self-Regulation Below the Self-Control Threshold Does not Consume Regulatory Resources. *Personality and Individual Differences*. 52(8): 898–902.

Van Eerde, W. (2003). A meta-analytically derived nomological net-work of procrastination. *Personality and Individual Differences.* (35): 1401–1418.

Von Borell, E.; Langbein, J.; Despres, G.; Hansen, S.; Leterrier, C.; Marchant-Forde, J.; Marchant-Forde, R.; Minero, M.; Mohr, E.; Valance, D. & Veissier, I. (2007). Heart rate variability as a measure of autonomic regulation of cardiac activity for assessing stress and welfare in farm animals: A review. *Physiology & Behavior*. 92(3): 293–316.

Wang, S.L. & Wu, P.Y. (2008). The role of feedback and self-efficacy on web-based learning: The social cognitive perspective. *Computers & Education*. 51(4): 1589–1598.

Watts, F.N. (1996). The International Journal for the psychology of Religion. *Psychological and religious Perspectives on Emotion*. 6(2): 71-87.

Weiner, M.J. & Mander, A.M. (1977). The effect of aversive consequences upon persistent behavior. *Motivation and Emotion*. 1(4): 367–376.

Weinstein, C.E.; Husman, J. & Dierking, D.R. (2000). *Self-regulation: Theory, research and applications.* Boekaerts, M., Pintrich, P. and Zeidner, M. (Eds). Orlando: Academic Press.

Wheat, A.L. & Larkin, K.T. (2010). Biofeedback of heart rate variability and related physiology: a critical review. *Applied psychophysiology and biofeedback*. 35(3): 229–42.

Whetmore, E.J. (1985). *Mediamerica: Form, content and consequences of mass communication.* 3rd ed. Belmont: Wadsworth.

Whited, A.; Larkin, K.T. & Whited, M. (2014). Effectiveness of emWave Biofeedback in Improving Heart Rate Variability Reactivity to and Recovery from Stress. *Applied psychophysiology and biofeedback*. 39(2): 75-88.

Wigfield, A.& Cambria, J. (2010). Students' achievement values, goal orientations, and interest: Definitions, development, and relations to achievement outcomes. *Developmental Review*. 30(1): 1–35.

Wilson, V.E.; Peper, E. & Schmid, A. (2006). *Applied Sport Psychology: Personal Growth to Peak Performance.* 5th ed. Williams, J.N. (Ed.). Boston: McGraw Hill.

Wolters, C. (2004). Advancing Achievement Goal Theory: Using Goal Structures and Goal Orientations to Predict Students' Motivation, Cognition and Achievement. *Journal of Educational Psychology.* 96(2): 236-250.

Worley, D.; Titsworth, S.; Worley, D.W. & DeVito, M.C. (2007). Instructional Communication Competence: Lessons Learned from Award-Winning Teachers. *Communication Studies.* 58(2): 207-222.

Yusuf, M. (2011). The impact of self-efficacy, achievement motivation, and self-regulated learning strategies on students' acedemic achivement. *Procedia - Social and Behavioral Sciences*. (15): 2623–2626.

Zain, A.N.M. & Jusoh, A. (2010). Instructional congruence and changing students' attitudes and interests toward science in "Low Performing" secondary schools. *Procedia - Social and Behavioral Sciences*. 2(2): 1260–1265.

Zakaria, J.B.; Musib, H.B. & Shariff, S.M. (2013). Overcoming Performance Anxiety Among Music Undergraduates. *Procedia - Social and Behavioral Sciences.* 90(2012): 226–234.

Zamhari, A. (2010). *Rituals of Islamic Spirituality: A Study of Majlis Dhikr in East Jaya*. Canberra: ANU E Press.

Zengyong, L. (2003). Effect of Magnitopucture on sympathetic and parasympathetic nerve activities in healthy drivers-assessment by power spectrum analysis of heart rate variability. *EUR J Appl Physiol. (*88): 404-410.

Zimmerman, B. (2002). Becoming a self-regulated learner: An Overview. *Theory into Practice.* 41(2): 64–74.

Zizzi, S.; Deaner, H. & Hirschhorn, D. (2003). The Relationship Between Emotional Intelligence and Performance Among College Basketball Players. *Journal of Applied Sport Psychology.* 15(3): 262-269.

APPENDICES

APPENDIX A

DEMOGRAPHIC FORM

Nama: _____

1. Umur: _____tahun

2. Aliran: 1 Sains 2 Sastera/Perdagangan/Agama

3. Jantina: 1 Lelaki 2 Perempuan

4. Keputusan Akademik Akhir Tahun:

APPENDIX B

INFORMED CONSENT FORM

LATIHAN BIOFEEDBACK HEART RATE VARIABILITY

Oleh: Wan Rusyaini Bt Wan Mohd

Universiti Malaysia Pahang

Anda akan menjadi salah seorang daripada 20 orang jumlah peserta dalam kajian ini yang akan menjalani satu sesi latihan. Setiap sesi berlangsung selama 12 minit. Anda akan diminta untuk melakukan pernafasan diafragma yang akan ditunjukkan sebelum eksperimen bermula. Alat yang digunakan di dalam kajian biofeedback ini *ear-clip sensor* menggunakan perisian Emwave Stress Relief®. Sebelum sesi latihan bermula, anda akan diajar teknik pernafasan diafragma yang betul. Kemudian, akan diminta mengikut rakaman zikir dan zikir sendirian di dalam hati.

MAKLUMAT PERSETUJUAN

Pengenalan

Anda diundang untuk turut serta dalam kajian penyelidikan untuk menilai hubungan pembelajaran pengawalan-diri, pernafasan, dan efikasi kendiri. Pengawalan-diri ini akan dibuat menggunakan Heart Rate Variability (HRV) ataupun variasi kadar degupan jantung dan latihan tindakbalas biologi (biofeedback).

Adalah sangat penting bagi anda untuk membaca dan memahami beberapa prinsip asas yang digunakan kepada semua yang mengambil bahagian dalam kajian ini:

(a) Kajian ini terbuka secara sukarela;

(b) Sebarang manfaat secara peribadi tidak dijamin walaupun kebanyakan orang telah mendapat manfaat daripada kajian sebelum ini;

(c) Sebarang penemuan penting yang berkati dengan pembelajaran anda akan dibincangkan bersama;

(d) Anda dibenarkan menarik diri daripada kajian ini pada bila-bila masa dengan apa jua alasan tanpa sebarang akibat.

Kajian semulajadi, risiko, kesulitan, ketidakselesaan, dan mana-mana maklumat yang bersangkut-paut tentang kajian ini dibincangkan dibawah. Anda diminta untuk membaca dokumen ini dan bertanya sebarang persoalan yang ada sebelum mempersetujui untuk turut serta dalam kajian ini.

Sila bertanya kepada Pn. Wan Rusyaini selaku ketua kepada projek penyelidikan ini untuk menjelaskan sebarang makumat yang tidak difahami. Kajian ini sedang dijalankan oleh Universiti Malaysia Pahang.

Latarbelakang Maklumat

Tujuan kajian ini adalah untuk mengesan keberkesanan latihan HRV biofeedback dalam mengukur efikasi kendiri. Kajian ini diharapkan dapat ditambah ke dalam penyelidikan yang sedia ada tentang penerapan biofeedback bagi subjek yang sihat

Tatacara Prosedur

Menggunakan satu set pasca-ujian untuk menilai sama ada sebarang kesan yang ketara terhadap efikasi kendiri anda.

Risiko dan Manfaat dalam Kajian ini

Kajian ini tiada sebarang risiko. Ia hanya membantu anda mempelajari teknik pernafasan yang betul untuk mencapai matlamat 100% LF (Low Frequency). Kajian menguji keupayaan kendiri anda mencapai matlamat yang digariskan dalam penyelidikan. Manfaat kajian ialah tabiat tindakbalas autonomik maksima menerusi pernafasan pada frekuensi tertentu. Anda boleh mengawal tindakbalas tubuh banda anda kepada faktor harian dan keputusannya, ia akan meningkatkan prestasi kerja anda.

Sulit

Segala maklumat yang didapati dari kajian ini akan kekal sulit, sehingga dibenarkan oleh pihak mahkamah. Segala yang diperkatakan dan data yang dikumpul daripada setiap peserta akan kekal sulit dan akan digunakan hanya sebagai kod subjek pada disertasi atau mana-mana penerbitan penyelidikan.

Sukarela kepada Kajian ini

Penyertaaan anda adalah secara sukarela. Anda berhak untuk tidak terus menyertai kajian ini pada bila-bila masa. Tiada keputusan yang negatif kepada anda untuk menyertai atau tidak. Sila bertanya sekiranya anda mempunyai soalan ini. Anda akan diberikan salinan borang ini untuk rujukan.

Kenyataan Setuju

Tandatangan saya dibawah ini menunjukkan bahawa saya telah membaca semua maklumat diatas dan berpeluang untuk menanyakan soalah bagi membantu saya memahami segala yang membabitkan penyertaan saya. Saya bersetuju untuk menyertai kajian ini

Tanda tangan: _____ Tarikh: _____

Tanda tangan penyelidik: _____ Tarikh: _____

APPENDIX C

DEPRESSION, ANXIETY, STRESS SCALE (DASS)

DASS *Nama:* *Tarikh:*

Sila baca setiap kenyataan di bawah dan bulatkan pada nombor 0, 1, 2 atau 3 bagi menggambarkan keadaan anda sepanjang minggu lalu. Tiada jawapan yang betul atau salah. Jangan mengambil masa yang terlalu lama untuk menjawab mana-mana kenyataan.

Skala pemarkahan adalah seperti berikut:

0 Tidak langsung menggambarkan keadaan saya.
1 Sedikit atau jarang-jarang menggambarkan keadaan saya.
2 Banyak atau kerapkali menggambarkan keadaan saya.
3 Sangat banyak atau sangat kerap menggambarkan keadaan saya.

1	Saya dapati diri saya menjadi kesal/marah disebabkan perkara-perkara yang kecil	0	1	2	3
2	Saya sedar mulut saya terasa kering	0	1	2	3
3	Saya tidak dapat mengalami perasaan positif sama sekali.	0	1	2	3
4	Saya mengalami kesukaran bernafas (contohnya pernafasan yang laju, tercungap-cungap walaupun tidak melakukan senaman fizikal).	0	1	2	3
5	Saya rasa diri saya tidak bergerak ke mana-mana	0	1	2	3
6	Saya cenderung untuk bertindak keterlaluan dalam sesuatu keadaan	0	1	2	3
7	Saya mempunyai perasaan gementar (seperti kaki menjadi lemah)	0	1	2	3
8	Saya rasa sukar untuk relaks	0	1	2	3
9	Saya dapati diri saya di dalam keadaan yang menjadikan saya amat risau dan menjadi tenang semula selepas ianya berakhir	0	1	2	3
10	Saya rasa saya tidak mempunyai apa-apa untuk diharapkan	0	1	2	3
11	Saya dapati saya mudah merasa kesal	0	1	2	3
12	Saya rasa saya menggunakan banyak tenaga dalam keadaan cemas	0	1	2	3
13	Saya rasa sedih dan murung	0	1	2	3
14	Saya dapati diri saya hilang kesabaran sekiranya saya dilambatkan oleh sesuatu (seperti lif, lampu trafik, terpaksa lama menunggu)	0	1	2	3
15	Saya rasa macam nak pengsan	0	1	2	3
16	Saya rasa saya hilang minat dalam segala hal	0	1	2	3
17	Saya tidak begitu berharga sebagai seorang individu	0	1	2	3
18	Saya rasa yang saya mudah tersentuh	0	1	2	3
19	Saya banyak berpeluh (contohnya pada tangan) walaupun bukan pada suhu tinggi atau tiada tiada pergerakan fizikal.	0	1	2	3
20	Saya berasa takut tanpa sebab yang munasabah	0	1	2	3
21	Saya rasa hidup inisudah tidak bermakna lagi	0	1	2	3

Translation by Dr Ramli Musa

Sila lihat muka surat sebelah ➡

Ingatan skala permarkahan: 0 Tidak langsung menggambarkan keadaan saya. 1 Sedikit atau jarang-jarang menggambarkan keadaan saya. 2 Banyak atau kerapkali menggambarkan keadaan saya. 3 Sangat banyak atau sangat kerap menggambarkan keadaan saya.					
22	Saya dapati diri saya sukar ditenteramkan	0	1	2	3
23	Saya rasa sukar menelan	0	1	2	3
24	Saya tidak dapat keseronokan dalam apa yang saya lakukan	0	1	2	3
25	Saya sedar tindakbalas jantung saya walaupun tidak melakukan aktviti fizikal	0	1	2	3
26	Saya rasa duka dan tidak keruan	0	1	2	3
27	Saya dapati diri saya mudah marah	0	1	2	3
28	Saya rasa hampir-hampir menjadi panik/cemas	0	1	2	3
29	Saya dapati sukar untuk bertenang setelah sesuatu membuatkan saya kesal	0	1	2	3
30	Saya risau saya akan 'dihambat' oleh tugas yang remeh dan tidak biasa dilakukan	0	1	2	3
31	Saya tidak bersemangat dengan apa jua yang saya lakukan	0	1	2	3
32	Saya sukar bersabar pada gangguan terhadap perkara yang sedang saya lakukan	0	1	2	3
33	Saya di dalam keadaan yang terlalu gementar	0	1	2	3
34	Saya rasa diri saya langsung tidak berharga	0	1	2	3
35	Saya hilang pertimbangan pada perkara yang menghalang saya meneruskan apa yang saya lakukan	0	1	2	3
36	Saya rasa amat takut	0	1	2	3
37	Saya melihat tiada masa depan untuk saya menaruh harapan	0	1	2	3
38	Saya rasa hidup ini tidak bermakna	0	1	2	3
39	Saya dapati diri saya semakin gelisah	0	1	2	3
40	Saya bimbang keadaan di mana saya mungkin menjadi panik dan melakukan perkara yang membodohkan diri sendiri	0	1	2	3
41	Saya rasa menggeletar (contohnya pada tangan)	0	1	2	3
42	Saya sukar untuk mendapatkan semangat bagi melakukan sesuatu perkara	0	1	2	3

APPENDIX D

SCRIPT ON AN OVERVIEW OF THE CLINICAL EXPERIMENTAL

The following is the script on the first explanation of an overview of the clinical experimental procedures.

TASK	OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
ICE-BREAKING	1. To break the ice among students. 2. To enable students to know the overall procedures and forms to be filled in before the training begins.	1. Smile to the students and try to build up a leisure gathering to avoid stress among them. 2. The researcher has been introducing her name and level of education in front of the students. This explanation was to give some details about the researcher, in order to avoid skeptical.	"*Nama saya Wan Rusyaini Bt. Wan Mohd. Saya merupakan pelajar sarjana daripada Universiti Malaysia Pahang.*	1. The researcher was standing in front of the students.
		1. Give a welcoming wish and positive perception to the students because of being chosen to experience the biofeedback training. 2. Explanation on the Informed Consent and Demographic Form and DASS Questionnaire that have to be	*Terima kasih kerana sudi datang dan kamu merupakan pelajar terpilih yang berpeluang untuk mengikuti latihan biofeedback yang akan saya terangkan sebentar lagi.* *Hari ini, kamu akan*	1. Informed Consent Form 2. Demographic Form. 3. DASS Questionnaire 4. Monitor

		filled by the students. 3. Brief explanation on the biofeedback training which involved Diaphragmatic Breathing and an Islamic repetition of words, the zikr of *"Lailahaillallah."* That the students will undergo in the clinical experimental. 4. Brief explanation on the biofeedback training by using the emwave Relief Stress desktop Software. 5. Brief explanation on the HRV.	*diberikan 2 set borang soalselidik yang perlu diisi sebelum mengikuti latihan biofeedback menggunakan perisian* emwave Software Kit *(tunjukkan alat tersebut kepada pelajar).* *Borang yang perlu diisi adalah Informed Consent and Demografik. Borang Informed Consent menyatakan kebenaran di pihak kamu untuk mengikuti latihan biofeedback. Manakala borang Demografik adalah berkaitan maklumat peribadi, ko-kurikulum dan akademk. Anda juga perlu mengisi borang soal selidik DASS untuk mengetahui sama ada kamu layak atau tidak untuk menjalani latihan biofeedback.* *Kemudian, saya akan menunjukkan demonstrasi Teknik Pernafasan Diafragma. Teknik ini membolehkan kamu rasa*	5. Emwave Stress Relirf desktop software. 6. Ear-clip sensor

			selesa dan jauh daripada stress, risau, takut atau marah. Sepanjang latihan ini, saya akan meminta kamu untuk berzikir "Lailahaillallah." *Kamu akan menjalani sesi eksperimen klinikal menggunakan perisian* emwave desktopstress relief *untuk mengukur HRV kamu semasa latihan.* *Tujuan latihan ini adalah untukmengukur kadar denyutan jantung kamu. Jadi, kamu akan menjalani teknik biofeedback yang ringkas menggunakan clip pengesan di telinga. Sebuah monitorakan memaparkan kadar denyutan jantung anda sepanjang latihan dijalankan."*	

APPENDIX E

SCRIPT ON HEART RATE VARIABILITY (HRV)

The following is the script on the second explanation of Heart Rate Variability and the relationship with emotion and physiology before the clinical experimental begun.

TASK	OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
EXPLANATION ON ANS AND HRV	1. To enable students to know the relationship between ANS and stress/anxiety. 2. To explain on the relationship between emotion and HRV.	1. Standing infront of the students while showing them an illustration of a human body. 2. Show them the location of Autonomic Nerves System and the braches of PNS and SNS and the relationship with emotion and physiology. 3. Explain the relationship between	"Asasnya, badan kita dikawal oleh *Autonomic Nerves System (ANS) yang terdiri daripada sistem saraf simpatetik dan parasimpatetik. Justeru, pada setiap masa, kita hendaklah pastikan bahawa badan kita berada dalam keadaan seimbang. Ini kerana ketidakseimbangan dalam kedua-dua sistem saraf akan memberi kesan terhadap tubuh badan kita. Sebagai contoh, jika sistem saraf simpatetik meningkat, parasimpatetik akan menurun. Penurunan di dalam sistem saraf parasimpatetik bermakna kita akan mengalami kesakitan di bahagian perut seperti gastrik, masalah pembungan air besar, cirit-cirit, denyutan jantung akan berdegup*	1. Explanation on the ANS and relation with emotion verbally. 2. A piece of A3 size paper on the illustration of human body. 3. An illustration of power spectrum or coherence scores.

		emotion and HRV by showing them a piece of paper illustrated the power spectrum or coherence score.	*kencang dan tapak tangan akan menjadi basah. Apabila kita tidak dapat mengawal emosi, kesannya adaah kepada kesihatan badan. Jadi, untuk menjadi orang yang sihat, setiap orang perlu pandai mengawal minda dan emosi.* *Untuk mengesan perubahan dalam ANS, salah satu cara adalah dengan meneliti perubahan dalam jantung. Perubahan dalam setiap degupan dengan degupan jantung yang lain dinamakan HRV.* *Jadi, pada hari ini, kamu dan saya akan melihat perubahan dalam degupan jantung yang akan dipaparkan pada monitor. Justeru, amat penting memastikan kamu berada di dalam keadaan tenang kerana sebarang perubahan dalam emosi akan mempengarugi data kadar denyutan jantung."*	

APPENDIX F

SCRIPT ON THE DIAPHRAGMATIC BREATHING TECHNIQUE

The following is the script on diaphragmatic breathing technique explaining the diaphragmatic breathing technique.

OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
1. To teach them the diaphragm breathing techniques to increase the HRV coherence score.	1. Explanation on the normal breathing technique. 2. Demonstrate the diaphragm breathing technique to the students. 3. When explaining the diaphragm breathing technique, the researcher put her left hand on the stomach and the right hand on the chest and followed by the students.	"*Untuk pengetahuan kamu semua, pernafasan mormal melibat 15 ke 22 pernafasan seminit. Di dalam latihan ini, saya akan perkenalkan kepada kamu pernafasan diafragma yang hanya melibatkan 6 pernafasan seminit. Tujuan mempraktikkan teknik ini adalah supaya kamu berasa tenang dan rehat.Jika kamu di dalam keadaan stress atau marah, ini adalah cara terbaik untuk mengawal emosi dan tingkah laku. Apabila melakukan teknik ini, bahu dan dada kamu tidak bergerak turun dan naik. Hanya bahagian perut sahaja yang bergerak turun naik. Posisi yang terbaik untuk berlatih adalah dalam keadaan berbaring. Untuk memastikan kamu melakukannya dengan betul, letakkan sebuah buku di atas perut. Apabila menarik nafas, perut kamu akan bergerak naik ke atas. Manakala apabila nafas dihembus, perut kamu akan bergerak turun ke bawah atau menjadi kempis. Pergerakan perut kamu dapat dilihat dengan*	1. Explanation on breathing technique verbally. 2. The demonstration of Diaphragmatic Breathing Technique.

		melihat pergerakan buku tersebut. *Teknik ini boleh dilakukan dalam pelbagai posisi sama ada duduk di atas kerusi atau berbaring di atas katil.* *Apabila menarik nafas, kadar masayang diambil adalah dengan cara mengira 1,2,3,4 dan disambung dengan menghembuskan nafas dengan kiraan 5,6,7,8,9,10,11.* *Tarik nafas dengan menggunakan hidung dan hembus dengan mulut yang terbuka sedikit. Cuba hembus nafas perlahan-lahan dengan menggunakan mulut yang terbuka. Masa yang diambil untuk menghembuskan nafas hendaklan lebih panjang daripada menarik nafas.* *Mari kita cuba sekarang… tarik nafas 1,2,3,4 dan hembus nafas 5,6,7,8,9,10,11. Pastikan perut kamu turun dan naik semasa proses menarik dan menghembus nafas.*	

APPENDIX G

SCRIPT ON THE EXPLANATION OF EQUIPMENT AND PROCEDURES DURING THE CLINICAL EXPERIMENTAL

The following is the script on the explanation of the equipment and procedures during the clinical experimental.

OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
1. To make them comfortable with the equipment to measure HRV and procedures of the clinical experimental.	1. The researcher prepared a monitor, ear clip sensor and the emwave Stress Relief software in front of the students. 2. Show the students an ear clip sensor and ask a student to sit in front of them to demonstrate on how to use the equipment. 3. When the student already sits on the chair, the program was started by register as a new user. 4. The researcher asked the student to breath normally and clicks at Run application and select HRV session, finally click the Start button to begin.	*Ini adalah klip pengesan telinga (ear clip sensor) yang terlalu sensitive dalam mengesan perubahan degupan jantung (tunjukkan kepada pelajar alat tersebut)* *Jangan takut dengan alat ini kerana ia tiada sebarang kesan negative. Kamu hanya perlu relaks sebarang sesi sambil bersandar di kerusi.* *Jadi, sepanjang sesi latihan, skamu akan memakai alat pengesan ini di telinga kamu dan kamu boleh melihat kadar degupan jantung menerusi graf daripada monitor yang mengadap kamu.* *Pada monitor akan ditunjukkan tiga jenis spectrum power yang dinamakan*	1. Ear Clip sensor. 2. Monitor 3. Emwave Stress Relief program.

	5. The researcher showed the students on the graph appeared while breathing and pointed at the coherence ratio column at the right of the screen program. 6. The researcher explained on the three kind of coherence score bar which is illustrated as green, blue and red colour. 7. The researcher emphasized on the target to achieve 100% LF coherence score by pointed out at the green bar (HF coherence score). 8. Then, the researcher stopped the session by clicking the Stop button. 9. When they understood the procedures, the researcher called randomly one of them to enter an air-conditioning room which next to the explanation's room.	high frequency (HF), low frequency (LF) and Very Low Frequency (VLF). *HF ditandakan sebagai bar berwarna biru, LF adalah bar berwarna hijau dan VLF, berwarna merah.* *Jadi, pada hari ini sasaran kamu adalah untuk mendpatkan **100% bar berwarna hijau iaitu LF**. Ketiga-tiga frekuensi berjumlah 100 mata. Ini bermakna, jika skor LF kamu adalah 100, skor untuk HF dan VLF adalah 0.* *Saya akan memanggil kamu seorang demi seorang untuk masuk ke dalam bilik latihan. Pelajar lain hendaklah diam sepanjang sesi latihan dijalankan. Ini kerana sebarag bunyi bising akan mengganggu konsentrasi dan emosi rakan kamu. Yang akhirnya akan memberi bacaan kepada skor dalam degupan jantung.*	

APPENDIX H

SCRIPT ON THE EXPLANATION OF PROTOCOLS

The following is the script on the task that the students have to do during the protocols in the clinical experimental.

OBJECTIVES	STEPS	SCRIPT	TEACHING AIDS
1. To make the students understand on the protocols during the clinical experimental.	1. Explanation on the protocols which is the baseline, pre-recorded *zikr* (PZ), self-*zikr*(SZ) and self-talk (ST). 2. The researcher asked them to recite an Islamic word, "*La ilaha illallah"*in their heart during the last three protocols which is PZ, SZ and ST. 3. Lastly, the researcher asked them to concentrate on the task, stay calm and try to achieve the targeted goal which is to reach the 100% LF coherence	*Dalam eksperimen klinikal ini, kamu akan melalui empat protocol iaitu* baseline, pre-recorded *zikr*, self-*zikr* and self-talk. *Pada protocol baseline, kamu boleh mula belajar mempraktiskan teknik pernafasan diafragma. Jadi, kamu dapat melihat perubahan yang diperolehi dalam skor keheren. Ia akan mengambil masa selama 3 minit dan saya akan meminta kamu berhenti.* *Manakala, pada protocol* pre-recorded zikr, *kamu hendaklah berzikir "La ilaha illallah" zikr mengikut zikir dalam pita rakaman. Berzikir di dalam hati dan pada masa yang sama, melakukan pernafasan diafragma. Ia mengambil masa 3 minit.* *Kemudian, kamu akan melalui protocol* self-zikr. Kamu dikehendaki berzikir "*La ilaha illallah" mengikut alunan sendiri sambil melakukan pernafasan diafragma. Berzikir di dalam hati juga*	Explanation on the protocols verbally.

	score.	*selama 3 minit.* *Akhir sekali, kamu dikehendaki berzikir lagi selama 3 minit di dalam hati.* *Sepanjang protocol, kamu digalakkan melihat bacaan koheren pada skrin monitor. Sentiasa perhatikan pencapaian koheren skor kamu pada setiap masa.* *Apabila koheren skor kamu tidak mencapai 100% LF lagi, teruskan berzikir dan cuba bernafas perlaha-lahan mengikut teknik pernafasan diafragma.* Manakala, apabila telah mencapai 100% LF koheren skor, cuba kekalkan pencapaian tersebut dengan cara teruskan berzikir dan bernafas perlaha-lahan seperti yang telah diajarkan tadi. Sila berikan tumpuan penuh pada tugasan ini, cuna tenang dan capai 100% LF koheren skor sepanjang latihan biofeedback ini.	

APPENDIX I

SAMPLE OF BIOFEEDBACK DEVELOPED SCRIPT STIMULATION

Notes

Script

Throughout the script practitioner's instructions are in italics.

Introduce the protocol to your client.

• Today you're going to learn an easy and effective way to reduce the impact of stress on your body and emotions.

• First, we'll talk a little bit about what stress is and the best way to reduce it.

• Next you'll learn an easy-to-use technique that you can practice throughout the day, especially when stress happens.

• We'll be using a computer program called the emWave® PC Stress Relief System so you can observe and chart your progress.

• Imagine your life if you truly felt calmer and had more energy.

Identify client's issues or challenges and establish goals for training/treatment.

• What are the stressors in your life? What causes you stress?

• What do you notice – physically, mentally and emotionally?

• Simply put, stress is emotional unease. Emotional unease can be experienced as anxiety, irritation, anger or hopelessness.

• These feelings often result from a deeper feeling or perception that we lack control over the events in our lives.

• The good news is that although we may not be able to control what's going on in the external environment, we can learn to control our feelings and perceptions.

• Often, after the stress response has been triggered and the alarm signals have been sent throughout the body, our habitual patterns of thinking and feeling can take over and make the stress even worse.

• These unconscious reactions eventually accumulate and drain our energy and over the long term, can lead to various health issues and challenges.

Chapter 9—Intervention Protocols

• Autonomic exhaustion is a clinical condition that occurs when long-term chronic stress depletes the autonomic nervous system. It is associated with feelings of exhaustion, fatigue, sleep disorders and body aches, as well as with a significantly increased risk of serious health problems.

• Positive emotions lead to energy renewal, resiliency and optimal learning.

• Generating positive emotions has more of a transformative impact than positive thinking.

• Positive emotions have many well-documented benefits, both psychologically and physiologically.

• Research has found that one of the easiest positive emotions to generate is appreciation. For most people, it is an easier emotion to generate than love or care. What many people don't realize is that it is positive feelings or emotions that actually provide the power for beneficial physiological change, not thoughts alone.

• The best way to improve the quality of your life is to change your automatic emotional reactions to external situations.

Describe how to use the Depletion to Renewal Plan. Show an example of a completed chart to client and introduce a blank copy for client's use.

• This chart shows the range of emotions we experience and how these emotions activate the autonomic nervous system and the hormonal system. The vertical line in the middle represents our autonomic nervous system, ranging from high to low arousal. The top of the axis represents high arousal, which means the sympathetic branch is more activated than the parasympathetic. For example, a near-accident or excitement can cause high arousal.

• Emotions drive physiology through two pathways: the autonomic nervous system and the hormonal system. • Autonomic is another word for automatic. Most of what the autonomic nervous system does is manage over 90% of our body's functions, those things we don't have to think about such as breathing, heart rate, digestion, etc.

• The bottom of this axis is labeled Relaxation because increased parasympathetic activity occurs when we are in a relaxed state. Feelings as different as calmness and boredom also are associated with low arousal. Most stress management approaches focus on relaxation by trying to decrease arousal, which is one reason most traditional stressreduction approaches happen outside the workplace; it's impractical to find a hot tub in which to relax in the middle of a tough phone call. If you're feeling anxious, impatient, frustrated or angry, relaxation simply turns down the volume, but it doesn't change the underlying perception of the situation.

Notes

HeartMath Interventions

Just relaxing isn't enough, because it actually decreases our performance.

• The horizontal line represents the hormonal system. On one hand, stressful feelings drive the release of the stress hormone cortisol. On the other hand, positive feelings reduce cortisol and increase DHEA, the vitality hormone. The balance between these two hormones contributes significantly to physiological depletion or renewal.

• We move in and out of all four quadrants every day. Together, they make up our emotional landscape.

• Where would you put your emotional experience on this chart?

• What do you do now to cope with negative feelings? Is it working?

• Where do you want to be on this chart?

• A good question to ask yourself now is: "Do I really want to keep draining energy and stressing about this situation?" That question can help stop your stress reaction immediately and prevent further drain on your mind and body.

Introduce the emWave PC Stress Relief System

• We're going to use the emWave PC so you can see what's happening in your body.

Instruct the client to sit properly and how to position the sensor.

Start the session and check the pulse-wave connection. (Click the 1 key)

Click to Full Screen HRV view.

Collect two or three minutes worth of baseline data to show the client how quickly the body responds to emotions.

• Remember a recent stressor.

• Now remember a positive or fun time.

Stop the session (Click the Q key) and point out how quickly the body responds to emotions.

APPENDIX J

SELF-REGULATION STIMULATION SCRIPT BEFORE AMENDMENT

BASELINE

"Saya mahu kamu kosongkan fikiran, tumpukan perhatian kamu sepenuhnya pada sesi ini. Bayangkan kamu berada di sebuah pulau yang tiada penghuni, tenang dan nyaman.

Saya mahu kamu lupakan segala masalah yang berlegar dalam fikiran.

Bertenang… tarik dan hembus nafas perlahan-lahan sehingga kamu rasa selesa dan tenang.

Baiklah. Boleh kita mulakan sekarang?"

SKRIP KEPADA PELAJAR:

1. Sebelum Stimulasi Skrip bermula:

"Sebentar tadi, kamu sudah melihat keputusan koheren. Jadi berikan sedikit masa untuk diri kamu agar benar-benar menghayati kalimah tersebut. Sekarang… saya mahu kamu terus tumpukan perhatian kepada zikir "Lailahaillallah." Saya tahu kamu boleh baiki lagi bacaan koheren yang kamu dapat. Kosongkan fikiran, tumpukan perhatian betul-betul kepada sesi. Sekarang saya mahu kamu lupakan semua masalah. Letakkan ketepi. Buat bersungguh-sungguh zikir ini. Fokus betul-betul kepada kalimah tersebut. Yakin yang kamu boleh dapatkan bacaan 100% koheren LF. Saya yakin kamu boleh!

Sekali lagi…cuba bertenang, tarik dan hembus nafas perlahan-lahan. Sekarang letakkan tangan kanan kamu di bahagian perut. Cuba rasakan udara yang masuk perlahan-lahan ke dalam paru-paru kamu, terus ke bahagian otak, mengalir ke seluruh anggota badan. Tarik…. Hembus perlahan-lahan… Kita mulakan sekali lagi. Tarik…… Hembus perlahan-lahan…. (2 kali). Sekarang mulakan zikir di

dalam hati … “Lailahaillallah… (intonasi rendah dan panjang). Teruskan berzikir Lailahaillallah…(2 kali).”

2. Semasa Stimulasi Skrip bermula:

“Cuba hayati kalimah “La ilaha illallah” dengan penuh rasa insaf… rasa rendah diri… rasa seorang hamba kepada Pencipta Yang Maha Agung. Bayangkan anda sedang berada betul-betul di hadapan Allah swt. (Berhenti sebentar). Tundukkan wajah anda di hadapan Yang Maha Besar dengan rasa penuh insaf. Bisikkan di dalam hati …“Ya, Allah, hambaMu ini telah lalai dalam mengingatiMu, Ya, Allah. Sesungguhnya aku telah menzalimi diriku sendiri, wahai Tuhanku. Bantulah aku kembali ke jalan Mu ya, Allah. Dengarlah pengakuan diriku yang banyak dosa ini, Yang Maha Agung. Lailahaillallah… Tiada Tuhan yang disembah melainkan Allah (Berhenti sebentar). ”

Teruskan membaca “La ilaha illallah” di dalam hati sehingga saya bagi isyarat berhenti. Teruskan berzikir…”

APPENDIX K

SELF-REGULATION STIMULATION SCRIPT AFTER AMENDMENT

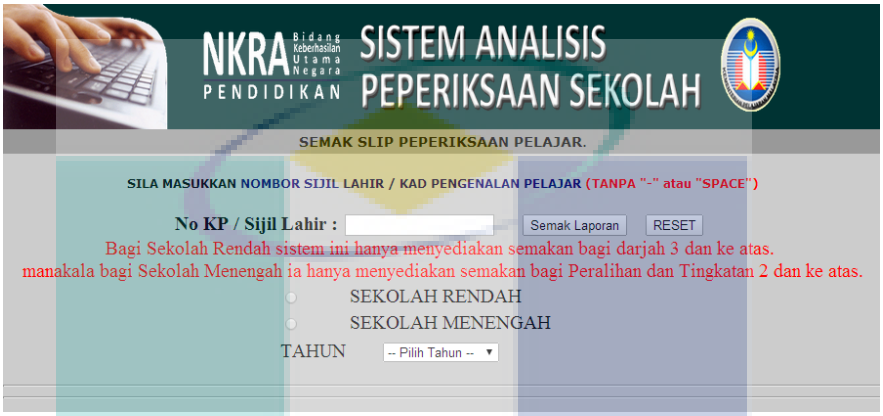
STIMULASI	BAHAN
BASELINE	"Saya mahu kamu kosongkan fikiran, tumpukan perhatian kamu sepenuhnya pada sesi ini. Bayangkan kamu berada di sebuah pulau yang tiada penghuni, tenang dan nyaman. Saya mahu kamu lupakan segala masalah yang berlegar dalam fikiran. Sekarang hanya ada kamu dan saya. Bertenang… tarik dan hembus nafas perlahan-lahan sehingga kamu rasa selesa dan tenang. Baiklah. Kita akan mulakan sesi ini sekarang."
PRE-RECORDED ZIKR	"Sekarang saya mahu kamu tenangkan fikiran dan fokus kepada matlamat untuk mendapatkan 100% koheren LF. Cuba tenang dan rehatkan diri, tarik nafas dan hembus perlahan-lahan. Ulangi proses ini sebanyak 3 hingga 5 kali sehingga kamu berasa tenang. Saya mahu kamu berzikir mengikut alunan rakaman zikir yang akan saya mainkan sebentar lagi. Sambil berzikir di dalam hati, lakukan teknik pernafasan diafragma yang betul. Sekiranya bacaan koheren kamu menurun, lakukan teknik pernafasan diafragma lagi sambil berzikir sehingga bacaan kamu kembali meningkat. Lakukan bersungguh-sungguh, tingkatkan bacaan koheren dan kekalkannya seberapa lama yang boleh. Kita mulakan dari sekarang dengan zikir "*La ilaha illallah*"

SELF-ZIKR	"Sekarang pula, saya mahu kamu berzikir di dalam hati sendirian sambil melihat pada skrin bacaan koheren kamu. Cuba tingkatkan bacaan koheren dan kekalkannya selama mungkin. Jika bacaan menurun, teruskan dengan teknik pernafasan diafragma sehingga mencapai koheren HF. Bersedia. Kita mulakan sekarang dengan zikir "*La ilaha illallah*" di dalam hati."
SELF-TALK	**SKRIP KEPADA PELAJAR:** **3. Sebelum Stimulasi Skrip bermula:** Sebentar tadi, kamu sudah melihat keputusan koheren. Jadi berikan sedikit masa untuk diri kamu agar benar-benar menghayati kalimah tersebut. Sekarang… saya mahu kamu terus tumpukan perhatian kepada zikir "Lailahaillallah." Saya tahu kamu boleh baiki lagi bacaan koheren yang kamu dapat. Kosongkan fikiran, tumpukan perhatian betul-betul kepada sesi. Sekarang saya mahu kamu lupakan semua masalah. Letakkan ketepi. Buat bersungguh-sungguh zikir ini. Fokus betul-betul kepada kalimah tersebut. Yakin yang kamu boleh dapatkan bacaan 100% koheren LF. Saya yakin kamu boleh! " Sekali lagi…cuba bertenang, tarik dan hembus nafas perlahan-lahan. Sekarang letakkan tangan kanan kamu di bahagian perut. Cuba rasakan udara yang masuk perlahan-lahan ke dalam paru-paru kamu, terus ke bahagian otak, mengalir ke seluruh anggota badan. Tarik…. Hembus perlahan-lahan… Kita mulakan sekali lagi. Tarik…… Hembus perlahan-lahan…. (2 kali). Sekarang mulakan zikir di dalam hati … "*La ilaha illallah"*… (intonasi rendah dan panjang). Teruskan berzikir Lailahaillallah…(2 kali) "

	4. Semasa Stimulasi Skrip bermula: "Cuba hayati kalimah "*La ilaha illallah*" dengan penuh rasa insaf… rasa rendah diri… rasa seorang hamba kepada Pencipta Yang Maha Agung. Bayangkan anda sedang berada betul-betul di hadapan Allah swt. (Berhenti sebentar) Tundukkan wajah anda di hadapan Yang Maha Besar dengan rasa penuh insaf. Bisikkan di dalam hati …"Ya, Allah, hambaMu ini telah lalai dalam mengingatiMu, Ya, Allah. Sesungguhnya aku telah menzalimi diriku sendiri, wahai Tuhanku. Bantulah aku kembali ke jalan Mu ya, Allah. Dengarlah pengakuan diriku yang banyak dosa ini, Yang Maha Agung. Lailahail-lallah… Tiada Tuhan yang disembah melainkan Allah (Berhenti sebentar). " Teruskan membaca "*La ilaha illallah*" di dalam hati sehingga saya bagi isyarat berhenti. Teruskan berzikir…

APPENDIX L

SAMPLE OF SAPS *(SISTEM ANALISIS PEPERIKSAAN SEKOLAH)*



APPENDIX M

LIST OF PUBLICATIONS

Wan Mohd, W.R. and Abdul Wahab, M.N. 2012. *Measuring Laziness Using Heart Rate Variability (HRV).* National Conference on Post Graduate Research 2012 (NCON-PGR 2012), Universiti Malaysia Pahang (UMP), 7-9 September 2012.

Wan Mohd, W.R. and Abdul Wahab, M.N. 2013. *The Laziness Scale*. Poster Presentation at the Creation, Innovation, Technology & Research Exposition 2013 (CITREX 2013), Universiti Malaysia Pahang, 27-28 March 2013. (Bronze Medal awarded).

Wan Mohd, W.R. and Abdul Wahab, M.N. 2013. *Measuring Laziness Using Heart Rate Variability (HRV)*. 4th International Graduate Conference on Engineering, Science & Humanities (ICGESH) 2013. Universiti Teknologi Malaysia, 16-17 March 2013.

Wan Mohd, W.R. and Abdul Wahab, M.N. 2013. *Measuring Persistence in Youth Competencies Development Using Using Heart Rate Variability (HRV).* International Conference on Youth (ICYOUTH) 2013. Universiti Putra Malaysia, Selangor, 29-31 October 2013. (ISBN: 978-967-10933-2-0).