The Relationship Between Discipline And Student Performance Using Heart Rate Variability (HRV) Biofeedback

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ABSTRACT
Discipline is one of the most important elements in shaping the core identity of individuals. Students who are lack of discipline will demonstrate lack of interest in education and this will consequently hinder the development of human capital. The aim of this study was to analyze the relationship between discipline and achievement by using the HRV. The respondents of this study were third year students from the Faculty of Civil Engineering and Natural Resources, Universiti Malaysia Pahang (UMP) and Universiti Tun Hussien Onn Malaysia (UTHM). A total of 50 respondents had been selected to undergo this study. The results showed a significant relationship between academic achievement and self discipline among students. For further study, larger sample size is required to verify the results of the research.

Keywords: Discipline, Student Performance, Heart Rate Variability

1.0 Background
Discipline is a word that is synonymous with our daily life. According to Foucault (2007), discipline is a form of inspection and getting oneself accustomed to a desired practice. According to the Cabinet Committee Report (1979), discipline is a type of training done in order to produce individual human being who are noble, rational, law-abiding, respect the rights of other individuals, responsible and willing to contribute to the society and the country. From the perspective of child development area, discipline refers to self-control and behavior (Papalia, Olds & Wendkos Duskin Feldman, 2006). According to Straus (2006) highly disciplined individuals possess certain degree of loyalty in doing things. This opinion was supported by Elicker et. al. (1992) and added another thing to the features; order. Order refers to the attitude or behavior of an individual in executing a command. Orderly, committed and consistent refer to self determination in doing things and always be firm about it (Turner, 2006).

Discipline also has a relationship with academic achievement. According to Baumrind, D. (1997), individuals with high academic achievement are more disciplined and responsible. Referring to psychological theory, the change in performance is related to self-concept. Shaffer (1985) and Rohaty (1992) described the self-concept as one's understanding or comprehension about oneself as an individual. According Rohaty (1992), self-concept can be classified into two types, positive self-concept and negative self-concept. Positive self-concept is defined as a condition or situation in which an individual believe and has confidence and able to accept criticism or view of rational situation, and this refers to individuals with high achievement.

Azizi et. al. (2005) explain that the negative self-concept is to have a mental and emotional that are prone to be influenced by outside elements and have no confidence when facing problems. Individuals that belong in this category are individuals who are lack of discipline and have low academic achievement.
To see more clearly the relationship between discipline and responsibility, HRV methods were used. HRV refers to the measure of the change in heart rate caused by physiological phenomenon. Akselrod et. al. (1981) found that when people are in a state of high stress and uncontrollable emotions, Autonomic Nervous System (ANS) will react where the Sympathetic Nervous System (SNS) will be activated, due to the increase in blood pressure and muscles then resulted in HRV changes.

2.0 Methods
Objective of this research was to analyze the relationship between discipline and student performance using HRV. The main biofeedback equipment being used in the experiment was Biograph Infinity Software to detect their emotion through their heart rate rhythm. The methods include the selection of the participants, the procedures of the research and the data analysis used to examine the result.

2.1 Participants
Total of 50 students were willing to participate in this study. The students were from different academic performance, i.e., students who have low academic performance and high academic performance. For this study, Grade Point Average (GPA) is used to measure the students’ academic performance. The interpretation of GPA level is under 2.00 until 2.50 GPA is low academic performance and 2.50 until 4.00 is high academic performance.

2.2 Apparatus
In conducting this study, the main instruments used are Pro Comp 2 and heart rate/ BVP sensor. These instruments are developed by Thought Technology Ltd (picture 1 and 2). Pro Comp 2 is a system that had been existed in conducting study about biofeedback. With the aid of this instrument, human physiological unit can be measured consisting of EMG, GSR, HRV and Resp. Data which is obtained from this method will be recorded in the Multimedia Biofeedback Software BioGraph Infiniti, and then will be analyzed. On the other hand, BVP sensor will record the data of the wave and amplitude of the heart rate. This sensor is worn at the finger on the non-dominant hand of the respondent, and then will be connected to Pro Comp 2, and the data will be seen and read from the computer.

2.3 Procedure
During this research, respondent will be given a test (stroop test and hypnosis) according to the script prepared by the trainer. There are six test sessions which the respondents have to go through. The period of time for the tests conducted in each respondents is 9 minutes. Before the experiment started, the information and data about the students must be obtained. Physiological status of the students must
be good for not influence the results. While doing that, researcher must create a friendly environment with the student and make students felt confortable.

In the first procedure, the baseline was fixed at 2 minutes while they were in a normal situation. After every 2 minutes test, respondents will be given one minute rest. The procedure can be seen on the Figure 1 below

![Research Procedure](image)

Figure 1: Research Procedure
Source: modified from Mobyen Uddin Ahmed et. al (2011)

3.0 Result and Discussion
The result presents for demographic of respondents and correlation between the discipline and student performance. The finding is displayed below.

3.1 Demographic of respondents
A total of 50 respondents from third year were selected for this research. The respondents’ age range is from 20 to 25, and they were from diversified ethnic and socioeconomic background. The demography profile of respondents is presented in Table 1 as follows:

<table>
<thead>
<tr>
<th>Demographic info</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Male</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>2. Female</td>
<td>26</td>
<td>52</td>
</tr>
<tr>
<td>GPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. &lt; 2.00 – 2.50</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>2. 2.50 – 4.00</td>
<td>25</td>
<td>50</td>
</tr>
</tbody>
</table>

Based on Table 1, the respondents were consisted of 24 individuals or 48% of them were male students and 26 individuals or 52% were female students. In terms of performance, the respondents were divided into two groups, those who obtained excellent academic achievements and honor awards (2.50 to 4:00) which 25 of them did and respondents who merely passed and respondents who failed (2.50 - <2.00) which 25 of them did.
3.1 The Relationship between Discipline and Student Performance

The results of the study found that respondents from group A produced mean of LF spectrum that was increased compared to HF and VLF for all test sessions while respondents from group B were less consistent in terms of the LF readings which in certain sessions LF mean was inconsistent. Table 2 shows the test results of independent samples T. Referring to Table 2, the test results show the value of (p) Sig. (2-tailed) was .002, which the value is smaller than the value \( \alpha = .05 \) and it can be concluded that there was a statistically significant difference in the mean values of HRV variables in group A (Mean = 1139, SD = 846) and group B (Mean = 509, SD = 494). This shows that HRV mean for group A is higher than group B.

<table>
<thead>
<tr>
<th>Group</th>
<th>Correlation Value ( (r) )</th>
<th>Significant Level ( (p) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.608**</td>
<td>0.01</td>
</tr>
<tr>
<td>B</td>
<td>0.411*</td>
<td>0.41</td>
</tr>
</tbody>
</table>

A. Significant correlation at level 0.05 (2-tailed)
B. Significant correlation at level(2-tailed)

In addition, correlation tests were also conducted to analyze the relationship between discipline and academic achievement using the HRV method. After running the analysis, the findings of Table 3 shows that there is a positive correlation \( r = 0.608; \ p < 0.01 \) for group A and \( r = 0.411; \ p < 0.05 \) for group B. This means that academic achievement has a strong positive correlation with HRV spectrum that the higher the respondents' CGPA, the higher their confidence and emotional level are. This suggests that group B respondents are less disciplined than the respondents in group A.

4.0 Conclusion

Based on the previous studies, it shows that there was a justification that students who obtained excellent academic achievement tend to have high self discipline. This research conducted based on HRV method clearly shows that there is a correlation between the formation of student discipline and academic achievement. Students who earn high academic achievement have high self discipline. Even though the methodologies used were different, the study supports the results of the previous studies. Academic achievement can be used as a benchmark to get an idea on individual's level of discipline.

REFERENCES


