

The Significant Effect of Wudu' and Zikr in the Controlling of Emotional Pressure Using Biofeedback Emwave Technique

Mohd Anuar Awang Idris, Muhammad Nubli Abdul Wahab, Nora Yusma Mohamed Yusoff

Abstract—Wudu' (Ablution) and Zikr are amongst some of the spiritual tools which may help an individual control his mind, emotion and attitude. These tools are deemed to be able to deliver a positive impact on an individual's psychophysiology. The main objective of this research is to determine the effects of Wudu' (Ablution) and Zikr therapy using the biofeedback emWave application and technology. For this research, 13 students were selected as samples from the students' representative body at the University Tenaga Nasional, Malaysia. The DASS (Depression Anxiety Stress Scale) questionnaire was used to help with the assessment and measurement of each student's ability in controlling his or her emotions before and after the therapies. The biofeedback emWave technology was utilized to monitor the student's psychophysiology level. In addition, the data obtained from the Heart rate variability (HRV) test have also been used to affirm that Wudu' and Zikr had had significant impacts on the student's success in controlling his or her emotional pressure.

Keywords—Biofeedback emWave, emotion, psychophysiology, wudu', zikr.

I. INTRODUCTION

EMOTION is closely related to an individual's actions. As is widely known, with healthy emotion, a person's actions may be better controlled. Previous researches have shown that individuals that are able to control their emotions are better at controlling their selves, actions and emotional pressure. On the other hand, those who are unable to control their emotions will experience problems in displaying their actions well; they may feel distressed, exhausted, suffer lack of confidence and easily lose their temper, all of which will indirectly affect their everyday activities.

By definition, biofeedback is a process which enables an individual to learn about how to change physiology activities to improve individual health and work. Hence, biofeedback is also the best instrument to measure physiological activities such as the brain wave, heart functions, breathing, muscle activities and skin temperature. This particular instrument is able to relay 'feedback' information in real-time to its users.

M. A Awang Idris is working with the Universiti Tenaga Nasional, Kampus Sultan Haji Ahmad Shah, 26700 Muadzam Shah, Pahang Darul Makmur, Malaysia (phone: 609-4552020; fax: 609-4552006; e-mail: anuara@uniten.edu.my).

M. N. Abdul Wahab is working with Universiti Malaysia Pahang, 26300 Gambang, Pahang DM, Malaysia (email: nubli@ump.edu.my).

N. Y. Mohamed Yusoff is working with the Department of Finance & Economics, College of Business and Accounting, University Tenaga Nasional (e-mail:nora@uniten.edu.my).

Biofeedback is also an alternative medical technique, whereby an individual will be able to learn to control his bodily functions such as rate of heart beat by simply using the mind. That is another biofeedback inherent objective is to help control variant rate of heart beats. In addition via biofeedback, it has been discovered that many workers are working below their actual cognitive levels due to exhaustion, depression, external pressure and boredom. Hence undoubtedly, biofeedback has also the capacity to improve individual work performances.

Wudu' etymologically is derived from the Arabic word 'Al-Wadhaaá' which means goodness and cleanliness. Meanwhile from the syara' (rulings) view, it means that the applications of clean water to pre-determined body parts (that is the washing of face, two hands until the elbows, part of the head and the two feet), preceded with the correct initial intention (niyyah) [1].

Zikr in etymology is derived from the Arabic word 'dzakara' which means remembering, in terminology; it means a practice speech through recitations and remembrance of Allah. Zikr is the physical and mental activities that form acceleration from reflection, attitude, and behavior until the process of life that reminds us of God [2]. Zikr is able to calm the mind and plays a role in determining a person's character. Zikr is the best traditions of worship and most pleasing to Allah, the lightest and most easily done by not having certain conditions and rules. It can be done at any time; any place and any state [3]. Zikr gives a sense of spiritual benefits. Psychologically, it also gives a sense of spiritual comfort and sense of being closer to God [4].

II. PAST RESEARCHES

Researches on problems of stress, anxiety and depression have been carried out on a large scale amongst working professional's [5]-[7]. The researches which were carried out on these emotional elements are important, as these elements may detrimentally affect the performances of an organization. In addition, it has been found that stress is one of the main contributors to health problems and weak performances of organizations [8]. Amongst the techniques popular in measuring and discovering the problem of stress is via biofeedback.

One of the researches, which were conducted among the female university students in Malaysia by Sutarto and Nubli [9], found that several improvements were made to the students' cognitive test results (Stroop test, oral, memory and

arithmetic tests) after having attended six biofeedback training sessions.

Vitasari et al. [10] used physiological treatments in order to reduce the anxiety levels of oneself through biofeedback trainings amongst university students. Individuals with high levels of anxiety were chosen for the research. Physiological tests were conducted on samples by measuring their heart beat rate and breathing per minute. ANOVA was then used during the assessments. Thirty-five students were involved in the biofeedback training sessions and they were given the full intervention throughout the 10 sessions. Heart beats per minute were measured using an electrocardiograph, while breathes per minute (BPM) were measured by breathing sensory. Results have shown, after the 10 sessions, students were able to control their heart beat and breathing better, which indirectly helps to reduce their anxiety levels.

Biofeedback technique is also used in the fields of military, medical, sports and education. This technique is proven effective in discovering mental problems such as ADHD, PTSD, ADD and other physiological problems such as hypertension, cardiovascular related, diabetic and others [11]. Biofeedback is also used as a technique in intervening problems such as poor work performances, lack of focus, poor memory and traumatic distractions [12]. In the medical field, biofeedback may be used to ascertain the changes and activities of the brain via electro-encephalogram (EEG) technology and changes in muscle structure may be discovered by using the electromyography (EMG) technology. Hence, changes in muscle tension may be measured clearly and individuals who are in high levels of stress will exhibit a relatively higher reading of EMG as compared to those who are not experiencing stress.

The same technique is being used in photoplethysmography (PPG) to measure the pulse beat, whereas galvanic skin resistance (GSR) helps to measure the skin's ability to become a good current conduit or otherwise. All of these techniques may measure the extent of how an individual influence the sympathetic nervous system (SNS) and the parasympathetic system (PNS). The imbalances between the two systems are the effect of changes of individuals' actions and perceptions. The biofeedback technique will be able to detect the changes and differences of the two systems within a very small scale [13]. The changes in emotions, thinking and heart will affect the changes on the PNS and SNS system, and hence, the balance between the two systems may be measured clearly.

III. STATEMENT OF PROBLEM

Previous researches have shown that many students at the higher education level are facing with a multitude of problems and pressures. Uncontrolled emotional pressures will adversely affect lives and personal day to day management, which will in turn affect negatively their academic performances and social and organizational activities. According to previous studies, biofeedback is one of the techniques used by researchers in measuring the problems of students' psychophysiology and emotions, especially to help increase the level of mind focus and ultimately better self-

control. For this research, it is hoped that some discoveries will be made as to the extent of success in using this technique with selected spiritual tools in helping students control their emotions and help to reduce their worry and anxiety levels. Finally, the success is also hoped to help the students produce more positive outcomes in their academics and social and organizational activities.

IV. RESEARCH OBJECTIVES

The objectives of this research are to:

- 1) Identify the current level of emotional distress of UNITEN's students.
- 2) Identify the extent and effectiveness of Wudu' and Zikr with biofeedback in tackling the emotional distress problems among UNITEN's students.

V. IMPORTANCE OF RESEARCH

It is hoped that the findings of this research will bring great benefit to many, especially students, educators and also UNITEN's student counsellors. These are among the important goals of this research:

- 1) To establish the awareness among students on the importance of identifying internal problems, especially the ones relating to emotional control and its effect.
- 2) Facts and information garnered from this research may be shared with the Students' Affairs office and the University's Counselling Unit for the purpose of handling various students' problems.
- 3) This research is also hoped to enlighten the Higher Education Ministry on how to overcome university students' problems via biofeedback emWave training.

VI. LIMITATIONS OF RESEARCH

This research was conducted on 13 students from the UNITEN's Students Representative Body, based at Sultan Haji Ahmad Shah campus Muadzam Shah, Pahang. Mainly, the venue of this research was the university's counselling room. The students were selected, as they were mostly holding leadership posts and were deemed to be facing many difficult situations and pressures around the campus. In addition, as student leaders they carry heavy leadership responsibilities and are expected to lead their fellow friends to the best paths available. In the future, it is hoped that the sample selection technique may be varied in accordance with different research objectives.

VII. METHODOLOGY

The methodology chosen for this research is descriptive analysis. Analyses were carried out on sample participants and relevant procedures. The research was conducted with the main aim of measuring differing levels of individuals' emotional pressures. Whereby, the analyses were hoped to reveal and affirm the positive effectiveness of Wudu' and Zikr with the aid of biofeedback emWave therapies to students' emotions.

A. Participants/Sample

Samplings were conducted on students in the UNITEN's Students Representative Body at the Muadzam Shah campus, Pahang. A total of 13 students were selected as a sample. They were individually placed in the counselling room and requested to answer the DASS (Depression Anxiety Stress Scale) questionnaire before the therapy sessions began. During the therapy sessions, the biofeedback emWave technique was used to identify and measure each student's level of emotional pressure.

1. Research Instruments

Fig. 1 shows the instrument that has been used in this research, the emWave kit. The instrument's function is to act as a controlling device which may help reduce emotional pressure, improve one's internal balance, and increase the energy level and performance of the participant. The instrument is uncomplicated and is suitable to be used anywhere; it is made up of mainly of a USB drive which will be connected to the computer, and a pulse identifier, which can be temporarily clipped to the ear.



Fig. 1 EmWave kit

Below are the steps of using the emWave PC:

- i. To begin, the emWave PC application will need to be downloaded on to the computer or laptop.
- ii. After successful downloading, attach the connector to the ear sensory device to the USB module.
- iii. Attach the USB Module to the USB port to the computer/laptop. Once connected, an announcement screen will appear on the screen of the computer/laptop.
- iv. Clip the other end of the ear sensory device to the participant's ear lobe (see Fig. 2).
- v. Open the EmWave PC application on the computer/laptop, and a screen, as the one shown in Fig. 3, will appear.



Fig. 2 Ear sensory device

- vi. Fill in the respondent's particulars (see Fig. 3), ensure that the ear sensory clip is securely clipped to the ear lobe, and then click the start button to begin and press the stop button to end the simulation.

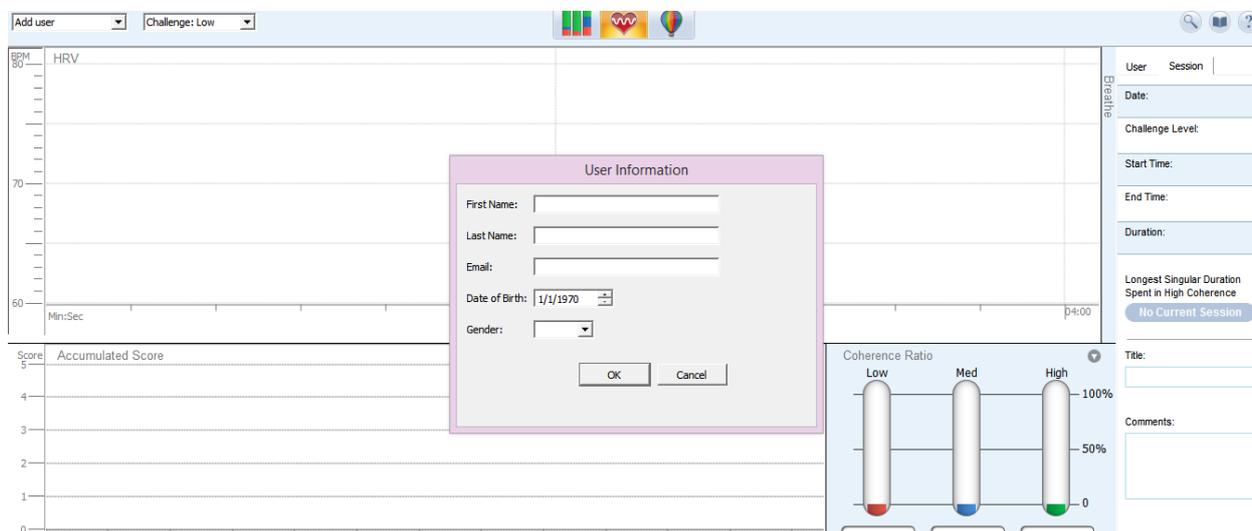


Fig. 3 Respondent particular

B. Procedures

In the test room, the student was required to answer the DASS questionnaire. Next, further tests were carried out for another three different sessions, with each lasting up to 5 minutes. During each session, the student was placed individually in the counselling room, which was prepared for

the participant to undergo tests with the aid of biofeedback emWave therapy.

Prior the tests, students were advised to calm themselves and to set themselves comfortably. Next, the researcher will attach the ear sensory device to the student's ear, the monitor will begin to display the heart beat readings. The average heart

rate and the coherence level ratio will be displayed during the sessions; thus, informing the researcher of the emotional condition of the student, and whether or not they were feeling pressured or distressed. The heart beat rate of the student will be measured and recorded using the emWave software desktop application, whereby their emotional level measurement may be identified via their heart beat patterns (see Table I). Each session is designed to assess and affirm the effectiveness of Wudu' and Zikr in helping the student control his or her emotional pressure.

With the completion of session 1, each student was required to take up Wudu' and the next biofeedback emWave session was then conducted. The students underwent the same requirement for the second session. For the third session, in addition to the Wudu' requirement, the students were taught to orally recite Zikr while undergoing the session. The student was required to physically recite "La Illaha Illallah" for 5 minutes during the session.

For this level, data would be collected to determine the average HRV and percentage of coherence ratio. Here, it is expected that the students would obtain a low value of coherence ratio, which meant that the students were already able to self-control themselves and their emotional pressure level too.

TABLE I
 EMOTIONAL LEVEL MEASUREMENT

Process Profile	Explanations
Coherence Ratio	<ul style="list-style-type: none"> Measurement- divided into three levels of bar charts; Low (Red), Medium (Blue), High Coherence (Green). The best emotional score aim is at 100%, High Coherence Ratio (Green) Low score indicates that the student (sample) did not have a stable emotion and has difficulty in controlling self-emotion.

The research findings were assessed from the display, as shown in Fig. 4.



Fig. 4 Student's demographic profile

The results shown in Fig. 4 display the student's demographic profile and the average of cohesion ratio. A further explanation is as below:

1. Students' Demographic Profile

Students' demographic profile displays the students' gender, age, race and the results of the Depression and Emotional scale tests. The student sample was comprised of male and female students. The majority of the students were aged 20-23 years old and were elected as a member of the Student Representative Body (see Table II).

2. Coherence Level Ratio

The aim of this measure is to assess the student's coherent physiological situation, whereby its readings may be changed/increased, and at the same time, it is able to control the emotional level of the students. Table III-V display the individual HRV readings before and after the sessions.

Table III shows the findings on the average heart rate value (HRV) and the coherence level ratio for the study involving 13 students from UNITEN's Students Representative Body at the Muadzam Shah campus, Pahang. It shows the average heart rate readings and coherence level ratio of each of the students

while undergoing the research's tests. Average heart rate recorded a minimum of 63 and a maximum of 101. As for the coherence level ratio, the recorded minimum was 18 and the recorded maximum was 96. The medium coherence ratio was a minimum of 4% and a maximum of 44%. As for the high coherence level ratio, the minimum was 0% and the maximum was at 57%.

TABLE II
STUDENTS' DEMOGRAPHIC PROFILE
Please Read and Tick Your Score

NO.	PERCEPTIONS	1	2	3	4
1.	I find it difficult to be calm				
2.	I feel that life is meaningless				
3.	I feel as though I may never ever feel positive				
4.	I experience difficulties in breathing (e.g. rapid breathing, out of breath without prior physical exertions)				
5.	I feel no motivation to start something				
6.	I am likely to over act in a situation				
7.	I have experienced tremors in the past (e.g. trembling hands)				
8.	I feel to distress				
9.	I am worried that something may happen which will make me panic and act foolishly				
10.	I feel I have no hope (e.g. loss hope)				
11.	I find that I am easily distressed				
12.	I find it hard to relax				
13.	I feel glum and sad				

1 Never, 2 Seldom, 3 Often, 4 Always.

TABLE III
SESSION I (BASELINE)

Respondent	Average Heart Rate	Coherence Level Ratio (%)		
		Low	Medium	High
1	63	96	4	0
2	78	80	8	12
3	75	59	19	22
4	80	43	44	13
5	64	60	20	20
6	71	50	28	22
7	72	64	32	4
8	66	70	27	3
9	90	83	15	2
10	91	18	25	57
11	72	85	5	0
12	101	96	4	0
13	91	70	15	15

Table IV showed the readings of average HRV and coherence level ratio when the students were tested. The average heart rate was recorded at a minimum of 61 and a maximum of 98. As for the coherence level ratio, for low coherence level, the minimum ratio was at 12% and the maximum was at 97%. As for the medium coherence level ratio, the minimum was at 7% and the maximum was at 44%. As for high coherence level, the minimum recorded was at 0% and the maximum was at 58%.

Table V shows the readings of average HRV and coherence level ratio when the students were tested. The average heart rate recorded at a minimum of 61 and at a maximum of 107.

For the coherence level ratio, the low level was recorded at a minimum of 2% and the maximum of 68%. For the medium coherence level ratio, the minimum was at 9% and the maximum was at 42%. As for the high coherence level ratio, the minimum was recorded at 8% and the maximum was at 72%. From this finding involving 13 student respondents, the green indicator recorded its highest at 72% and the second highest at 69%.

TABLE IV
SESSION 2 (WUDU')

Respondent	Average Heart Rate (HRV)	Coherence Level Ratio (%)		
		Low	Medium	High
1	63	73	7	20
2	80	75	14	11
3	76	82	18	0
4	74	62	16	22
5	61	12	30	58
6	62	64	20	16
7	68	56	44	0
8	67	60	29	11
9	93	81	11	8
10	88	79	14	7
11	74	67	23	10
12	98	97	3	0
13	88	48	24	28

As a summary, it was found that the coherence level after undertaking Wudu' had increased from session 1, while the coherence level after Zikr undertakings had increased from session 2 onwards. Referring to the average coherence level and the HRV Biofeedback from session 1 to session 2 (Wudu'), the findings affirm the earlier expectations about the spiritual tool's effectiveness, whereby the results derived majorly show positive results after the sessions. Meanwhile, the coherence level and biofeedback HRV effects from session 2 (Wudu') to session 3 (Zikr) had shown high effectiveness, as the majority of the findings showed improved test results.

TABLE V
SESSION 3 (ZIKR)

Respondent	Average Heart Rate (HRV)	Coherence Level Ratio (%)		
		Low	Medium	High
1	62	65	18	17
2	74	21	20	59
3	77	13	19	69
4	81	43	21	36
5	61	11	21	68
6	66	43	9	48
7	65	21	42	37
8	69	2	24	56
9	80	8	29	72
10	86	49	15	34
11	73	68	23	8
12	107	68	22	10
13	88	38	20	42

VIII. CONCLUSION

In all, the emotional stability indicator has shown significant improvements after the undertakings of Wudu' and Zikr practices. It may be seen via the three colour indicators,

whereby red represents low coherence level, blue for medium coherence level and green for high coherence level. It was found that when the subject had undertaken the Wudu' and Zikr practice, the colour indicator was displayed as green, whereby the highest reading level was at 100%.

These findings have proven that Wudu' and Zikr forms of therapy will deliver ideal positive effects on a sample subject's emotional control. Observations have also shown that there were changes in average HRV readings and cohesion level ratio when the subjects were undergoing the tests. When the emotions of the sample students were calm and in control, the coherence level ration will become lower, which means that the students had already succeeded in controlling their emotional pressures.

As a conclusion, the findings from this research have proven that Wudu' and Zikr therapies with the aid of biofeedback emWave have positively and significantly helped the students in effectively controlling their emotional pressures.

ACKNOWLEDGMENT

The authors would like to acknowledge the Fundamental Research Grant (FRGS) of Malaysia Ministry Higher Education (MOHE) under the Research and Development, for funding this research.

REFERENCES

- [1] M. H. Yahaya, .Ensiklopedia Solat, Kuala Lumpur: Penerbit Telaga Biru, pp. 10-12, 2011.
- [2] Amin and al-Fandi, Energy DZikr, Jakarta: Penerbit Amzah, pp. 6-8, 2008.
- [3] A.Y Saleh, BerZikr Untuk Kesehatan Saraf, Jakarta: Penerbit Zaman, pp. 35-40, 2010.
- [4] I. Khan, Dimensi Spiritual Psikologi: Bandung: Pustaka Hidayah, pp. 52-58, 2000.
- [5] J.C. Chang, "Effect of meditation on music performance anxiety". Doctoral Dissertation. Columbia University Teachers College, New York, USA. Retrieved from ProQuest Database UMI Number 3014754, 2001.
- [6] N. Suvorov, "Psychophysiological Training of Operators in Adaptive Biofeedback Cardiorhythm Control". The Spanish Journal of Psychology 9 (2): 193-200 Retrieved July 1, 2006.
- [7] A.P Sutarto, "The effect of HRV biofeedback for the improvement of cognitive performance among female manufacturing operators", Unpublished Doctoral Dissertation. Universiti Malaysia Pahang, Pahang, 2011.
- [8] B. M. Appelhans and L. J. Luecken. "Heart rate variability as an index of regulated emotional responding", Review of General Psychology, VOL.10: p.p. 229-240, 2006
- [9] A.P. Sutarto and A.W. Nubli, "The effect of HRV biofeedback for improving operators' cognitive performance", in Proceedings of Fifth International Cyberspace Conference on Ergonomics, 2008.
- [10] P. Vitasari, A.W. Nubli, N.M., T. Herawan, A. Othman and S.K Sinnadurai, "A Pilot Study of Pre-Post Anxiety Treatment to Improve Academic Performance for Engineering Students". Accepted at WCES 2011, to appear in Procedia Social and Behavioral Sciences, 2011.
- [11] P. M. Lehrer, "Biofeedback training to increase heart rate variability", in Lehrer P.M. Woolfolk R.L., & Sime, W.E. Principles and Practice of Stress Management (3rd Ed.). New York: The Guilford Press, 2007.
- [12] R. M. Craty, "The scientific role of the heart in learning and performance". (Publication No. 02-030, 2003). Boulder Creek, CA: HeartMath Research Center, Institute of HeartMath. Retrieved November 10, 2007.
- [13] B.W Strack, "Effect of Heart Rate Variability (HRV) Biofeedback on Bating Performance in Baseball", Doctoral Dissertation, Alliant

International University, San Diego, 2003. Retrieved from ProQuest Database UMI Number 3083450, 2003.



M. A. Awang Idris is a Senior Lecturer at Department of Business & Social Sciences. He is currently working at Universiti Tenaga Nasional (UNITEN) and has been working as an academic since 2001. He earned his M.A (Islamic Studies) in Dawah and Human Development from Universiti Kebangsaan Malaysia, 2008 and B.A (Islamic Studies), Universiti Kebangsaan Malaysia, 1995. His expertise research areas are Biofeedback, Dawah, Human Development and Humanities Soft Skills. He has already published more than 10 papers in research articles and projects especially in bio feedback, psychophysiology research and human development studies. His recent research and projects are as follow:

1. M.A. Awang Idris & N.Y Mohamed Yusoff, "Fiqh Awlawiyah & Application of Principles Maslahah in theory Use of Islam: Principles and Applications in Forming an Islamic Social Welfare Function", College of Management and Accounting Business, Pahang, pp. 26, 2009.
2. M.A. Awang Idris & N.Y Mohamed Yusoff, Application of Principles of Fiqh Awlawiyah Maslahah in Theory and Application Islam, Al-Sirat, vol. 10, pp.137-157, 2009.
3. M.A. Awang Idris & N.Y Mohamed Yusoff & K.N Mat Karim, "Preacher among Aboriginal Youth: Case Study in the village of females", Rompin, PahangAl-Sirat, vol. 9, pp.88-97, 2009.
4. M.A. Awang Idris & N.Y Mohamed Yusoff, "Impact of BBA financing instrument towards: A Case Study in Southeast Pahang", The Journal of Muamalat and Islamic Finance Research, vol.1, pp.167-190, 2004.
5. M.A. Awang Idris & N.Y Mohamed Yusoff & K.N. Mat Karim, "Indigenous perceptions of Preachers: A Case Study in the village of females, Rompin, Pahang", the International Seminar on Islamic Da'wah & Youth Development SMEs, pp.42-59, 2007.
6. M.A. Awang Idris & N.Y Mohamed Yusoff, K.N. Mat & Karim, "Applications Interfaith Dialogue in Islam: An Expose in the Prophet's Heritage", Seminar: Applications and Challenges during the Sunnah, USIM, pp.97-114, 2007.



M. N. Abdul Wahab is an associate professor in psychophysiology studies in human development studies. He is currently associate professor at Universiti Malaysia Pahang, Malaysia. He earned his PhD in Management Information Systems from the Universiti Putra Malaysia, in 2005. His expertise research area are Biofeedback, Human Development and Technology Information System Development for Humanities Soft Skills. He has already published more than 100 papers in research articles especially in bio feedback and psychophysiology research. His completed research and projects are as follow:

1. M.N. Abdul Wahab & Urme Binte Salam, "Drug Addiction Intervention for Adolescents with Religious Spirituality and Biofeedback". 17th Biofeedback Foundation Europe Meeting, February 11-15, 2014 ISUVE, Venice, 2014.
2. M.N. Abdul Wahab et al., "GreenVec Biofeedback Game (GVBG) using Galvanic Skin Response Sensor for Human Meditation Improvement". Proceeding for International Conference on Computer Science and Information Technology (CSIT-2013), June 16-18, 2013, Universitas Teknologi Yogyakarta, 2013.
3. M.N. Abdul Wahab, "Development of Integrated GreenVec Biofeedback Game with Galvanic Skin Response Sensor". Proceeding for 3rd International Conference on Software Engineering & Computer Systems (ICSECS - 2013), 20-22 Ogos, Universiti Malaysia Pahang, 2013.
4. M.N. Abdul Wahab et al., "Effect of Integrating Devoutness-Based Islamic Prayer and Skin Conductance Responses among Female College Students. African Journal of Traditional Complementary and Alternative Medicines, 2012.



N. Y. Mohamed Yusoff is a Senior Lecturer at Department Finance and Economics of Universiti Tenaga Nasional (UNITEN) and has been working as an academic since 2003. Her PhD studies in Energy Economics (will be having VIVA on 21st of March 2017), at University Tenaga Nasional, Putrajaya, Malaysia. Graduated with M.A (Islamic Finance and Economics)

(2003) University Malaya, Kuala Lumpur, Malaysia and B.Econs in Economics and Administration (Hons) (1995). Currently she is a member of International Energy Economics Associations (IEEA) of Unites States, a member of the Malaysia Energy Centre (PTM), a member of the Malaysia Economics Association (MEA), member of Malaysia Finance and Economics Association. She also involved as National Consultant/Researcher for National Greenhouse Gas Inventory Report for Malaysia 2011 and 2012. She published and presented academic papers in both local and international journal and conference on various topics such as Energy Policy Reform, Energy Economics, Macroeconomic, Fiscal Policy and Oil Price Shocks analysis. Her recent energy published research articles are as below:

1. N.Y Mohamed Yusoff &, H.A Bekhet, "Impacts of Energy Subsidy Reform on the Industrial Energy Structures in the Malaysian Economy: A Computable General Equilibrium Approach," International Journal of Energy Economics and Policy, vol. 6(1), pp.88-97, 2016.
2. H.A. Bekhet & N.Y Mohamed Yusoff, "Evaluating the Mechanism of Oil Price Shocks and Fiscal Policy Responses in the Malaysian Economy, In IOP Conference Series: Earth and Environmental Science," vol.16 (1), pp.012010, IOP Publishing, 2013.
3. Bekhet, H.A. & N.Y Mohamed Yusoff, "The Effect of Energy Subsidy Removal on Energy Demand and Potential Energy Savings in Malaysia," Procedia Economics and Finance, vol.35, pp.189-197, 2016.
4. Bekhet H.A. & N.Y Mohamed Yusoff, "Assessing the Relationship between Oil Prices, Energy Consumption and Macroeconomic Performance in Malaysia: Co-integration and Vector Error Correction Model (VECM) Approach," July 2009, International Business Research Journal, Canadian Centre of Science and Education, vol. 2(3), pp.152-179, 2009.