

# RATED PERCEIVED EXERTION OF PERSONNEL OF AN AVIATION INSTITUTE - AEROSPACE SECTION OF UNIVERSITI KUALA LUMPUR MALAYSIAN INSTITUTE OF AVIATION TECHNOLOGY

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**Abstract.** In the world of aviation, it's imperative that its workers are well educated and trained. There are numerous aviation institutes that offer courses in aviation such as aircraft maintenance, aircraft design, ground handling and others. Universiti Kuala Lumpur Malaysian Institute of Aviation Technology (UniKL MIAT) offers courses in Aircraft Maintenance and the philosophy behind Aircraft Maintenance is safety where workers with astute skill, knowledge, and mindset would maintain the aircraft efficiently and thus retain safety at its highest level. In order for UniKL MIAT to produce such astute workers, the teaching staffs need to be at it's best physical shape in order to deliver the output. This paper collected data of the Rated Perceived Exertion (RPE) of the staffs of the Aerospace Section of UniKL MIAT in order to gauge their physical comfort when engaging their tasks. Individuals that are in good physical shape would normally be comfortable in most tasks and our paper addressed that which in turn gave results of the physical fitness of the staffs in the Aerospace Section of UniKL MIAT.

**Keywords:** Aerospace Section, Aviation Institute, Aviation Technology, Kuala Lumpur Malaysian Institute

## 1. Introduction

In any organization, it's imperative for the workers to be in good or great physical shape in order to perform and produce desirable output. Workers that are not fit would perhaps produce results that are of low quality. Jonathan and Mbogo, in their paper, stated that a worker who is unhealthy would perform unsatisfactory and their research was to ensure health of teaching staff is maintained [1]. They also touched upon the wellness of the teaching staff and how this affects productivity [1].

Bichi stated that the stature of the students produced by an institution depends upon the effectiveness of the academicians in imparting their knowledge and skills [2]. He further stated that in order to increase the institution output, in terms of student's

performance, it's vital for the academicians to perform their best [2]. He also stated that it's also important to gauge the strength of each academician in order to appropriately harness their abilities.

Gewasari, Manullang, and Sibuea, in their paper, had indicated that 76.6% of the outcome of learning of the students is due to the output or the accomplishment of the academicians during lecturing [3]. They also stated that academicians have to be competent in order to produce students that are good and desirable.

All the researchers above are in agreement that the performance of the academicians played a role in fostering and producing graduates or students that are competent, skillful, and viable. Hence it is vital for us to gauge the fitness of the staff or academicians of UniKL MIAT in order to critically assess their fortitude in producing graduates as mentioned above. We however decided to only focus, in arbitrary fashion, upon academicians of the Aerospace Section of UniKL MIAT.

Low fitness of academicians would render the syllabuses partly undelivered or the syllabuses are delivered without fluency due to the fact that the lectures are frequently interrupted to accommodate the health of the academicians. The effect of unfinished syllabuses is high as students would not gained the appropriate knowledge. The effect of delivery of syllabuses without fluency is also high as the students would perhaps not fully comprehend the knowledge gained.

Thus as mentioned earlier, its imperative to measure the fitness of the academicians and we had arbitrary decided to use Rated Perceived Exertion (RPE) as the measuring tool. RPE measures the exertion produced by an individual during a task. The measurement is via the perception of the individual where the individual is asked to rate the degree of exertion when conducting a task. The degree of exertion is based upon a scale of 1 till 10 where 10 indicates "feeling extreme difficulty" while actuating a task and 1 indicates "feeling very easy" while actuating a task. This scale is called the Borg Scale and was produced by Borg to measure the fitness level on an individual [4]. To give readers perspective of the scale, we offer a scenario : two individuals, where one has high fitness level and the other has low fitness level, actuate similar task. The one with high fitness level would feel at ease actuating the task, thus would perhaps rate his/her exertion as 2 in the Borg Scale. The one with low fitness level would feel difficulty actuating the task, thus would perhaps rate his/her exertion as 9 in the Borg Scale. We also offer several examples of researchers using RPE in the Literature Review Section.

As mentioned, our focus is only upon academicians of the Aerospace Section and its limited to academicians that have recent (as of 3 years back starting from 2017 till 2020) lecturing and researching experiences within the realm of Aerospace Section. This is to maintain the fidelity of the data collected as subjects or modules within the Aerospace Section are different from subjects from other sections of UniKL MIAT. The

subjects under the Aerospace Section are considered “heavy” or arduous. Such examples of these subjects are Computer Programming, Mechanics of Materials, and others.

## 2. Literature Review

Assiri in his paper had stated that a worker’s performance would be reduced if he or she is unfit or unhealthy where this would subsequently decrease the productivity of the organization [5]. He further opinionated that health issues of workers would eventually incur cost to the company or organization. Rembiasz had indicated that if one’s physical fitness had deteriorated, one’s ability of actuating a task or completing a job would decline [6]. Rembiasz also mentioned that workers need to have an optimum level of fitness in order to cope with situations at work.

Meanwhile Muda, Rafiki, and Harahap stated that employee’s performance is dependable upon the abilities of the employee where unfit employee (does not have the physical ability) would decrease the performance of the organization [7]. They in fact mentioned “medical matters” and provided insights that these matters, which formed when employees are unfit, would affect job performance as well. This is in agreement with the notion stated by Sharifzadeh where Sharifzadeh pointed out that most academic papers indicated that there is a relationship between fitness and productivity [8]. When fitness increases, the productivity of the individual increases as well.

Deniz, Noyan, and Ertosun had stressed that its vital for an employee to have adequate ability in order to perform well in his or her tasks [9]. We can paraphrase this as being able to perform physical tasks within his or her physical ability, thus making it important to be physically fit. Serra mentioned that its imperative to gauge the fitness of the workers in order to measure their ability to perform well in their jobs [10]. Furthermore, gauging their fitness would also give indication whether they are at risk or not while conducting their tasks.

Edwards and Bolitho had mentioned that the World Health Organization (WHO) indicated that employees that are healthy or fit would somehow increase the productivity level of their workplaces [11]. Furthermore, by maintaining the fitness level, it would seep into the workplace culture and provide a healthier workplace continuously which in hand maintain productivity. Samian and Noor had pointed that hard work is one of the criteria that should be ingrained in a lecturer or academician. In order to maintain or reach that “hardworking” status, one has to be fit in order to physically toil constantly [12]. Another point to be pondered is the fact that the academicians mentioned by Samian and Noor were advised to self reflect in order to increase their performance.

One of the methods that can be used to evaluate one's fitness is the method called Rated Perceived Exertion (RPE). Eston had indicated that RPE could be used to measure the fitness of athletes and even sedentary individuals where RPE has the ability to quantify physical intensity that one has gone through [13]. RPE is also suitable to assess loads that are induced upon individuals, whether the individuals feel strain or not while going through the loads. Williams stated that worker's exertion during work is best to be measured using RPE where actual lifting can be quantified and graded using RPE [14]. Williams further stated that RPE could be used towards workers at numerous fields, such as academicians, since measurements take into account physical sensations.

Gamberale was interested in the physical work that employees had actuated and the degree of difficulty that one goes through actuating the work. Gamberale mentioned RPE as a tool to measure the difficulty of physical work that an employee goes through [15]. Gamberale also indicated that work performance is related to how well an employee perform during the physical work. Burke is supportive of the usage of RPE even though some called it subjective. Burke argued that the subjectivity is actually an advantage and the intensity of tasks is adequately measured by RPE [16].

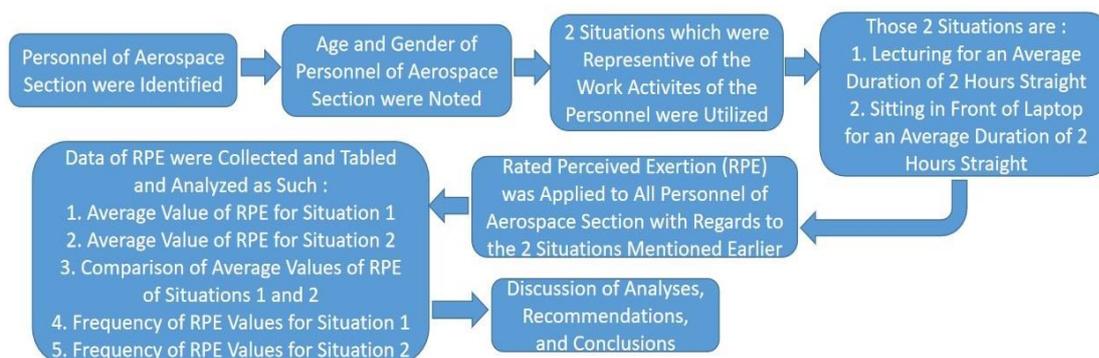
Barene, Krstrup, and Holtermann used RPE to measure the exertion induced upon female employees employed at a hospital. This shows the breadth of RPE which could be used in myriad fields [17]. Jakobsen also used RPE where RPE was used to figure out whether physical exercises had benefited workers in terms of physical fitness. Jakobsen focused primarily upon female workers with an average age of 42 years old [18].

Measuring discomfort of employees, which entails measuring their fitness as well, could also be done using RPE and Carregaro had done this to measure fitness of healthcare workers [19]. Carregaro was concerned on the musculoskeletal discomfort that are among the workers. RPE has such an extensive usage and even was used to measure the fitness level of computer workers as was done by Lindegard [20]. Lindegard had measured 853 participants from various workplaces and had concluded the viability of RPE.

### **3. Methodology**

The methodology to assess the fitness of employees of Aerospace Section is shown in Figure 1. As mentioned earlier, we constricted our assessment upon academicians that had recent 3 years experiences (2017-2020) lecturing within the Aerospace Section in order to maintain the fidelity of our data. Their age and gender were also noted. We then proceeded to identify 2 situations that were prominent in the work of

Aerospace Academicians. Those 2 situations are lecturing for an average of 2 hours straight and sitting in front of the laptop or workstation for an average of 2 hours straight (this is to facilitate report writing, composing of academic papers, actuating analyses, grading of papers of students, and others). The former is denoted as Situation 1 while the latter is denoted as Situation 2.



**Figure 1. The Methodology of Fitness Assessment of Staff of Aerospace Section**

The 2 situations above were presented / asked / queried to the academicians of the Aerospace Section and we took note of the RPE values mentioned by each academician with regards to those 2 situations. As mentioned earlier, we used a scale of 1 till 10 where 1 means the exertion is extremely easy while 10 means the exertion is extremely difficult. We collected these RPE values and actuated analyses as shown in Figure 1. We then discussed these analyses and offered recommendations and conclusions.

#### 4. Results

The overall number of eligible academicians from the Aerospace Section is 30 (eligible here means academicians that had recent 3 years experiences (2017-2020) lecturing within the Aerospace Section). We calculated the minimum number of respondents needed to answer our queries where the calculation was based upon these values : Population Size = 30, Confidence Level = 80%, and Margin of Error = 10%. The Population Size is the number of eligible academicians from the Aerospace Section. We set the Confidence Level and Margin of Error as such as we intended this research to be the initial catalyst and subsequent papers of the same nature would be more progressive in terms of accuracy of representation. The calculation showed that we needed a minimum of 18 respondents and we managed to gain that 18 respondents

that had responded to the queries of the 2 situations. This thus validated our approach. Our quest is to gain a mere representation of the Aerospace Section, thus we were content with the number of respondents.

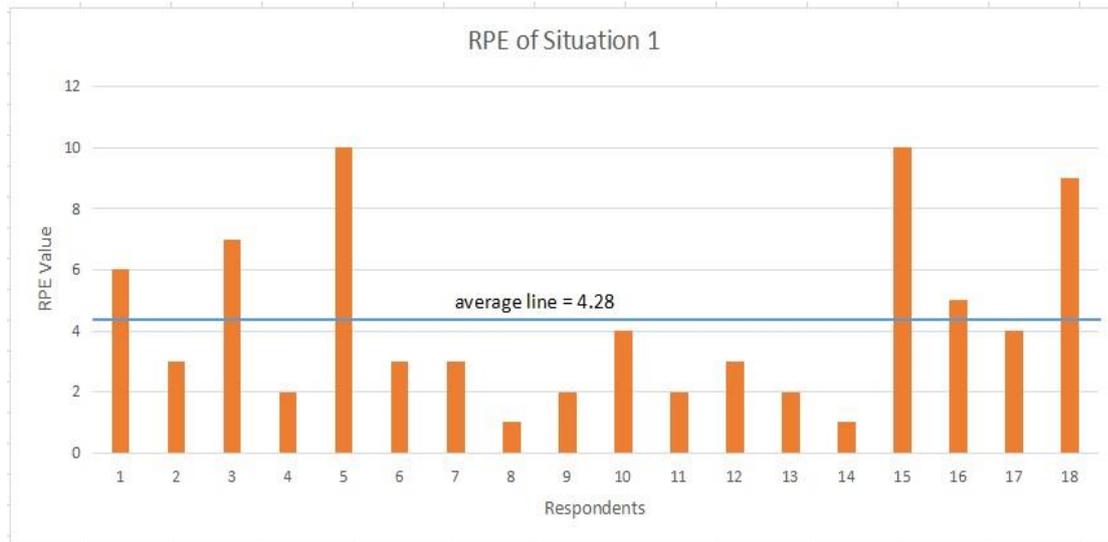


Figure 2. The Average Value of RPE for Situation 1

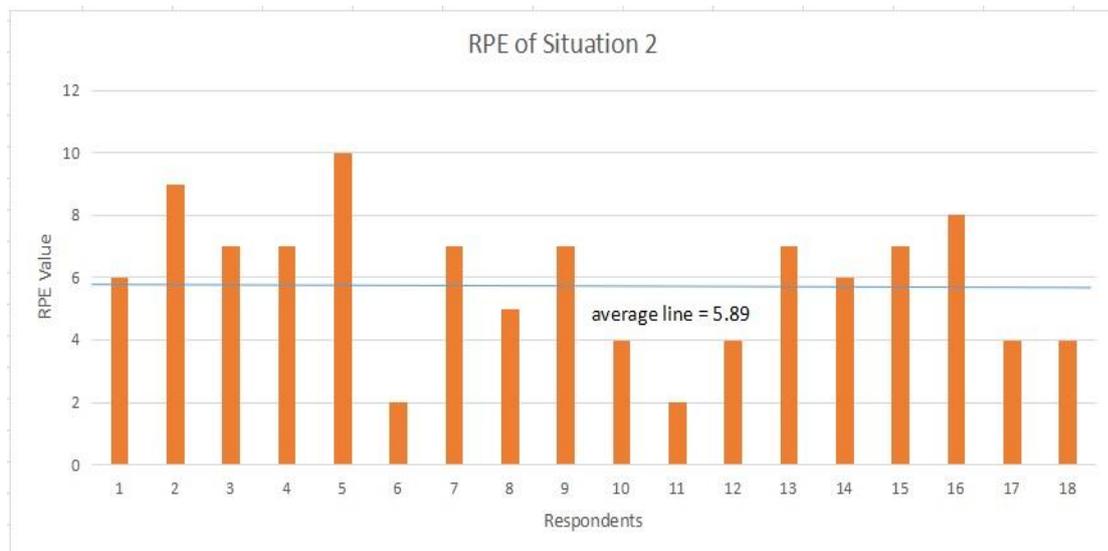


Figure 3. The Average Value of RPE for Situation 2

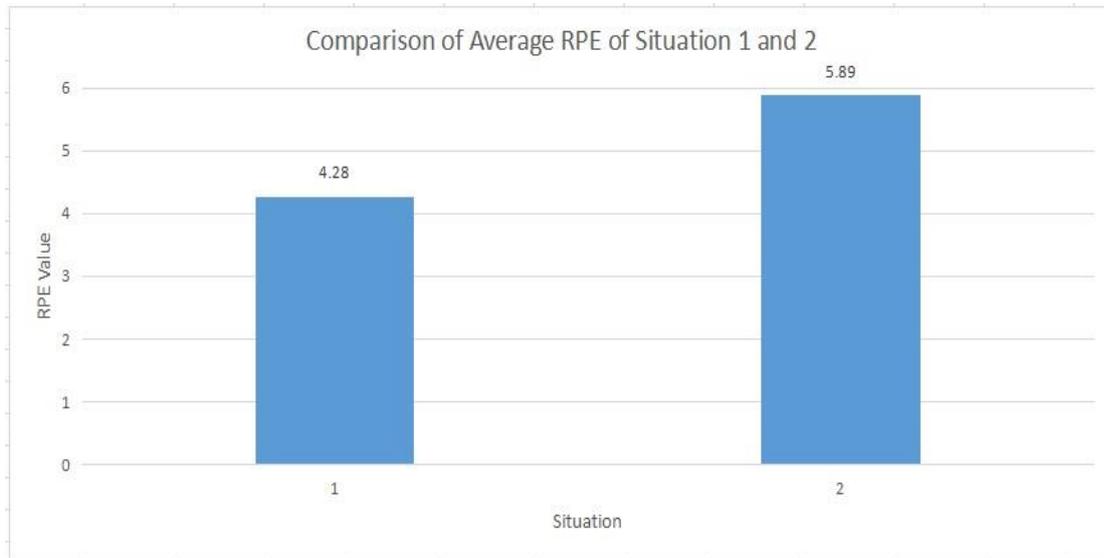


Figure 4. Comparison of Average Value of RPE of Situation 1 and 2

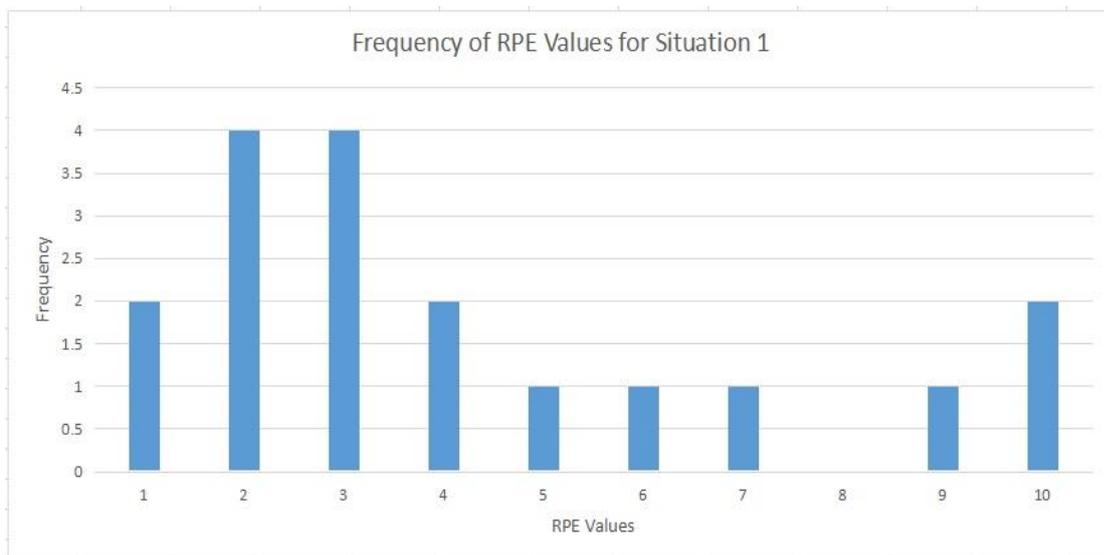
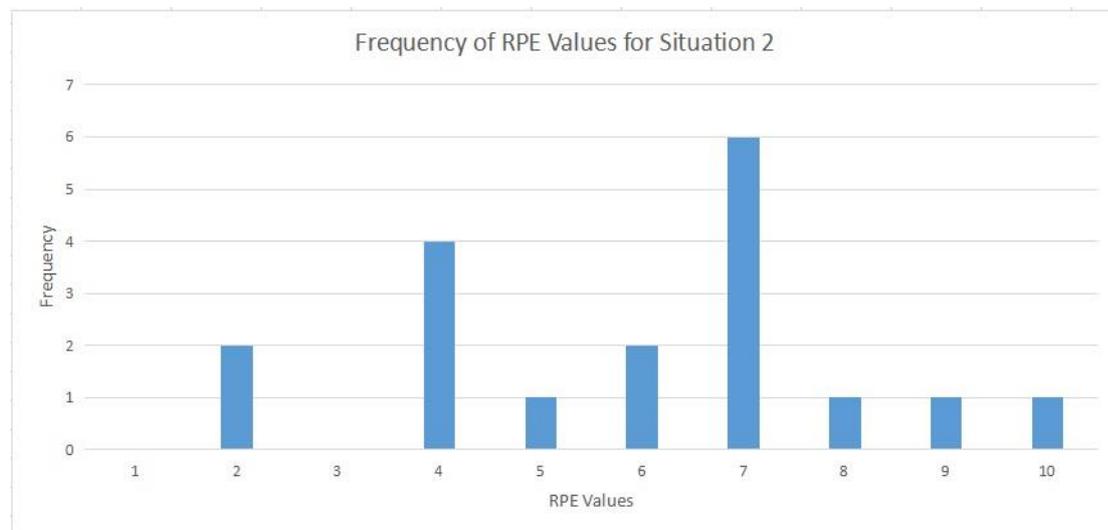


Figure 5. Frequency of RPE Values for Situation 1



**Figure 6. Frequency of RPE Values for Situation 2**

## 5. Discussion

Figure 2 shows the average value of RPE for Situation 1. The average value is 4.28 which is within the realm of “easy” as it has not surpass the middle point of 5. This entails that lecturing for an average of 2 hours straight is considered or “felt” easy for most aerospace academicians.

Peering Figure 3, we found out that most aerospace academicians felt that sitting in front of the laptop or workstation for an average of 2 hours straight is considered hard or difficult as the data showed the average value of RPE for Situation 2 is 5.89 which is within the realm of “hard”. Sitting for a long duration of time puts a toll on one’s back and we can slightly say that perhaps most aerospace academicians need to strengthen their cores or abs in order to reduce the strains upon their backs.

Figure 4 indicates that Situation 2 is much more difficult to comprehend where the difference between Situation 1 and 2 is 1.61 which is not much of a difference. Perhaps with the exercise prescribed in the earlier paragraph, the RPE for Situation 2 could be reduced.

Looking at Figure 5, it seems that 2 aerospace academicians has extreme difficulty in handling Situation 1. Both of these academicians had chosen the value 10 to represent their exertions. Lecturing for an average of 2 hours straight requires strong legs and hips and we recommend that these 2 academicians perform squats and jumps to enhance the muscle mass at their legs. There were also 3 academicians which had denoted Situation 1 as 6, 7, and 9 respectively and this is also of concern. We also prescribe squats and jumps for these academicians as well.

In Figure 6, 6 aerospace academicians had chosen the value 7 to represent their exertions in Situation 2. This is quite a lot and seemingly alarming. As mentioned earlier, core or abs exercises could aid in lessen the strains on their backs. We also would like to advise these academicians to add mobility while actuating their tasks. Examples of such mobility is getting up from their chair to stand and stretch their hips and also twisting or rotating their hips clockwise and anti clockwise to relief the strain or to revive their muscles.

## **6. Conclusions**

By analyzing the data obtained, we had gained insights upon the physical fitness of the aerospace academicians. There is quite an alarming trend as several academicians were having difficulties in performing their tasks. In the Discussion Section we had discussed several solutions to lessen these difficulties. Examples of these solutions are core exercises and squat movements. The data that we had collected also contain other parameters such as gender and age but this paper did not scrutinize upon them but we are proposing the detail examination of these data in subsequent papers.

## **References**

- [1] Jonathan, G.K., Mbogo, R.W., "Maintaining Health and Safety at Workplace : Employee and Employer's Role in Ensuring a Safe Working Environment", *Journal of Education and Practice*, Vol. 7, No. 29, 2016, ISSN 2222-1735 (Paper).
- [2] Bichi, A.A, "Evaluation of Teacher Performance in Schools : Implication for Sustainable Development Goals", *Northwest Journal of Educational Studies*, Volume 2, No. 1, December 2017.
- [3] Gewasari, M., Manullang, B., Sibuea, A.M., "The Determinant Factors that Effect Teacher Performance of Public Senior High School in Deli Serdang District", *IOSR Journal of Research & Method in Education*, Volume 7, Issue 1, Version IV, Jan - Feb 2017, e-ISSN : 2320 - 7388.
- [4] Borg, G., "Psychophysical Bases of Perceived Exertion", *Medicine & Science in Sports & Exercise*, 14(5) : 377-381, 1982, ISSN Print : 0195-9131.
- [5] Assiri, W., "Risk of Loss of Productivity in Workplaces", *International Journal of Scientific & Technology Research*, Volume 5, Issue 05, May 2016, ISSN 2277-8616.
- [6] Rembiasz, M., "Impact of Employee Age on the Safe Performance of Production Tasks", *MATEC Web of Conferences* 94, 07009 (2017), CoSME'16, DOI 10.1051 / mateconf / 20179407009.
- [7] Muda, I., Rafiki, A., Harahap, M.R., "Factors Influencing Employees' Performance : A Study on the Islamic Banks in Indonesia", *International Journal of Business and Social Science*, Vol. 5, No 2, February 2014.
- [8] Sharifzadeh, M., "Does Fitness and Exercises Increase Productivity? Assessing Health, Fitness, and Productivity Relationship", *American Journal of Management*, Vol 13 (1) 2013.

- [9] Deniz, N., Noyan, A., Ertosun, O.G., "Linking Person-Job Fit to Job Stress : The Mediating Effect of Perceived Person-Organization Fit", *Procedia - Social and Behavioral Sciences* 207 (2015) 369 - 376.
- [10] Serra, C., et. al., "Criteria and Methods used for the Assessment of Fitness for Work : A Systemic Review", *Occup Environ Med* 2007, 64:304-312, DOI : 10.1136/oem.2006.029397.
- [11] Edwards, G., Bolitho, L.E., "Improving Workforce Health and Workplace Productivity : A Virtuous Cycle", Position Statement, Royal Australasian College of Physicians & Australasian Faculty of Occupational and Environmental Medicine, October 2013.
- [12] Samian, Y., Noor, N.M., "Student's Perception on Good Lecturer Based on Lecturer Performance Assessment", *The International Conference on Teaching & Learning in Higher Education (ICTLHE 2012)*, Klana Resort Seremban, 10 - 12 April 2012.
- [13] Eston, R., "Use of Ratings of Perceived Exertion in Sports", *International Journal of Sports Physiology and Performance*, 2012, 7, 175 - 182, Human Kinetics, Inc.
- [14] Williams, N., "The Borg Rating of Perceived Exertion (RPE) Scale", *Occupational Medicine* 2017, 67 : 404 - 405, doi : 10.1093/occmed/kqx063.
- [15] Gamberale, F., "Perception of Effort in Manual Materials Handling", *Scandinavian Journal of Work, Environment & Health*, Print ISSN 0355-3140, Electronic ISSN 1795 - 990X.
- [16] Burke, E.J., "Perceived Exertion : Subjectivity and Objectivity in Work Intensity Assessment", *The Perception of Exertion in Physical Work*, Wenner-Gren Center International Symposium Series, Palgrave Macmillan, London, 1986.
- [17] Barene, S., Krstrup, P., Holtermann, A., "Effects of the Workplace Health Promotion Activities Soccer and Zumba on Muscle Pain, Work Ability and Perceived Physical Exertion among Female Hospital Employees", *PLoS ONE* 9(12) : e115059, doi : 10.1371/journal.pone. 0115059.
- [18] Jakobsen, M.D., et. al., "Physical Exercise at the Workplace Reduces Perceived Physical Exertion during Healthcare Work : Cluster Randomized Controlled Trial", *Scandinavian Journal of Public Health*, July 8, 2015.
- [19] Carregaro, R.L., et. al., "Association Between Work Engagement and Perceived Exertion Among Healthcare Workers", *FisioterMov Curitiba*, v.26, n.3, p.579 - 585, jul./set. 2013, ISSN 0103-5150.
- [20] Lindegard, A., et. al., "Perceived Exertion, Comfort and Working Technique in Professional Computer Users and Associations with the Incidence of Neck and Upper Extremity Symptoms", *BMC Musculoskeletal Disorders* 2012, 13:38.