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Analysis of mental burden of students based on NASA-TLX at DAYAH DMA

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ABSTRACT

One of the organizations in Aceh that deals with religious instruction and learning is Dayah DMA. Students who pursue higher education and are enrolled in religious education institutions are known as mahasantri, and they are thought to possess greater physical and psychological development than students in regular schools. No doubt learning in two distinct locations has different job demands, which could put more strain on Mahasantri's mind. This study aims to determine the causes of high mental load on mahasantri and investigate potential disparities in mental burden according to gender, status, and class levels. Purposive sampling is used in this study to handle primary data from 56 mahasantri respondents who completed questionnaires as part of a quantitative approach. According to the research that was done, 50% of mahasantri, or 28, report having a significant level of mental strain. Physical demand has the highest impact on mahasantri's mental burden, accounting for 18.35% of the total. Subsequently, an independent sample t-test conducted with SPSS version 26 was employed to statistically evaluate the average mental burden score to ascertain whether mental burden varied according to gender, status, and class level categories. The burden for gender and status categories did not differ, according to the results. But in terms of mental load, there was a notable variation for the class level category.

Keywords: Mental burden; mahasantri; NASA-TLX; gender; status.

1. INTRODUCTION

Humans require both mental and physical energy to do daily tasks; the quantity required varies according to the difficulty of the task. Workloads vary according to the degree of difficulty of any human function [1]. A workload is an assortment of tasks that an organizational unit or job holder needs to finish in a specific amount of time [2]. The workload is present in all institutions, including educational ones, not just in some of them. Education is the endeavor to acquire more knowledge from official and informal sources to produce better people. Setting the appropriate educational goals is essential to achieving the desired quality [3].

Dayah DMA offers lodging to students from various universities. The degree of difficulty and quantity of assignments, time constraints, ambiguity between abilities and assumptions, lack of control, disorganized policies, competing demands, social interactions, and the environment can all contribute to the mental strain that Dayah DMA students endure. Students are expected to exhibit strong moral character, positive outlooks, and intellectual fortitude in the face of such situations. If such situations are not handled right away, they may lead to a chain of stressors that burden kids' minds. Academic, learning and class-related stressors are the root cause of high levels of depression. He went on to say that stress, anxiety, and depression are significantly influenced by age and gender [4]

Based on the findings of preliminary observations, it is known that a student and a santri face several issues, including difficulty splitting time, conflicting schedules, the emergence of sloth, the emergence of weariness, and tension. This may result in a heavy mental load, requiring students to exert effort. Extra attention is needed for students and santri, particularly for mental or psychological loads that might lead to excessive mental burdens, weariness, and other bad effects on the students and associated institutions.

When an administrator performs their duties well and in motivated circumstances, their assessment of the attention load (between their persuasive boundaries and the set task requirements) is known as the workload of spinning [5]. The type of job, the working environment, the response and completion times, and individual elements (such as motivation level, level of knowledge, translation abilities, and allowed performance tolerance) are additional aspects that affect an individual's workload when doing a job [6][19]. Workload can be divided into two categories: spinning workload and physical workload. All activities undoubtedly have an impact on workload. Since spinning activity cannot be directly observed, spinning workload cannot be detected in the same way as physical workload, which can be observed, predicted, and measured more objectively. Therefore, compared to the conventional notion of physical labor, the concept of a balanced spinning workload becomes more difficult to understand [7]. The physical workload is the difference between the amount of labor required and the worker's actual ability to complete the work [8][20].

Stress results from environmental acts, situations, or events that exert an excessive amount of psychological and physical demands on an individual. Stress is a response to self-adjustment that is impacted by individual characteristics and psychological processes [9]. Stress can elicit a range of reactions in people, and studies have shown that these reactions can be helpful markers of stress in people and gauge their levels of stress. Two categories of stress exist, specifically: Eiustreis is the outcome of a constructive, good, and healthy (balanced) reaction to stress. This encompasses the health of people and institutions linked to development, adaptability, flexibility, and high-performance levels. Distress is the outcome of an unhealthy, negative, and detrimental (damaging) reaction to stress. Consequences for both individuals and organizations are included in this [10]. An individual experiencing stress may exhibit physiological reactions, such as elevated blood pressure, heart rate, pulse rate, and respiratory system. Additionally, cognitive disturbances, including thought disorders and impaired concentration, may also be observed, as well as emotional reactions such as fear, anxiety, shame, and anger [11].

One way to measure respondents' subjective workload is the National Aeronautics and Space Administration Task Load Index (NASA-TLX), which can be used to intuitively get subjective evaluations from respondents. In 1998, over a three-year cycle of laboratory simulations, Sandra G. Hart of NASA-America Research Center and Loweill Ei. Staveiland of San Jose State University balanced the method. This approach is calibrated using a nine-factor scale that is based on subjective self-reported qualities that have emerged (task difficulty, time pressure, activity type, physical effort, mental effort, performance, frustration, stress, and divinity). These nine criteria are further reduced to six: performance, effort, frustrations, time constraints, mental effort, and physical effort. Over 4,400 studies that demonstrate the impact of NASA-TLX on human factor research have cited this. Numerous industries, such as aviation, healthcare, and other complex socio-technical industries, have embraced this concept [12]. A multidimensional scale that gives an evaluation of workload based on the average of six subscales is used as the weighting mechanism in NASA-TLX. This scale includes the following items: performance (Performance), effort level (Effort), frustration level (Frustration), mental demand (Mental Demand), physical demand (Physical Demand), and time demand (Temporal Demand) [13].

The t-test is one of the difference tests in the survey that can be used to ascertain how the population's method has changed. It is employed to determine whether two samples, collections, or information groupings differ from one another. The t-test, which is a component of the parametric test, needs to fulfill requirements including information circulation. A factual test called the Independent Sample T-test is designed to find the middle ground between collections of unique or irrelevant data. This test requires the data to be homogeneous and normally distributed, but it also looks at the variation between the two groups of data. Therefore, before finishing the T-Test, it's

crucial to determine if the information comes from similar variations (equivalent differences) or unequal variations [14.16].

2. METHOD

Steps for checking the workload of spinning using the NASA-TLX method [15][17][18].

a. Describe each NASA-TLX spinning workload indicator. The NASA-TLX approach divides the workload's dimensions across multiple subscales, including investment, physical, import, benefit, financial, and performance costs.
b. Weighing: 15 paired comparison questionnaires were created at this point. Choosing one of the two paired comparisons from the six indicators was how the assessment was done. The indication that was chosen is the one that has the biggest impact on how much of a spinning workload people experience while working. The indicators that are thought to be most important in producing the spinning workload are calculated to determine each indicator's weight.
c. Rating: At this point, participants are requested to rank the six NASA-TLX indications on a scale of 0-100. Next, a subjective conversion of the respondents' perceived workload into this assessment scale is made.
   - To calculate the product, multiply the weight and rating of the six indications. This yields the product.

$$\text{Product} = \text{rating} \times \text{work weight} \quad (1)$$

   - Weighted Workload (WWL), obtained from the sum of six product values.

$$\text{WWL} = \sum \text{product} \quad (2)$$

   - The average WWL is calculated by dividing the total number of paired comparisons of the six NASA-TLX indicators (15) by the WWL.

$$\text{Skor} = \sum \frac{product}{15} \quad (3)$$

d. Interpretation of results
   The interpretation of spinning workload scores using the NASA-TLX method can be categorized as follows.
   - Very low category if the score value 0–9
   - Low category if the score is 10–29
   - Medium category if the score value 30–49
   - High category if the score value 50–79
   - Very high category if the score value 80–100

3. RESULTS AND DISCUSSION

Results

Table 1 displays the findings from NASA-TLX's computations of Dayah Darul Mui'arrif Al-Aziziyyah students' mental stress.

Table 1. Categories of student workload at Dayah Darul Mui'arrif Al-Aziziyyah

No	WWL average range	Workload Level	Number (Respondents)	Percentage %
1	0 – 9	Very Beautiful	0	0%
2	10 – 29	Low	14	25%
3	30 – 49	Currently	7	13%
4	50 – 79	High	28	50%
5	80 - 100	Very high	7	13%
Total			56	100%

At Dayah Daruil Mui'arrif Al-Aziziyyah, students have a wide range of workload levels; the average workload weight ranges from 0–9, or in the very good category, to 25–29, or in the beautiful category; 30–49, or in the moderate category, to 12%; 50–79, or in the high category, to

approximately 50%; and the remaining 13%, or in the very high category, with a range of 80–100. Figure 1 shows the distribution of the six NASA-TLX parameters.

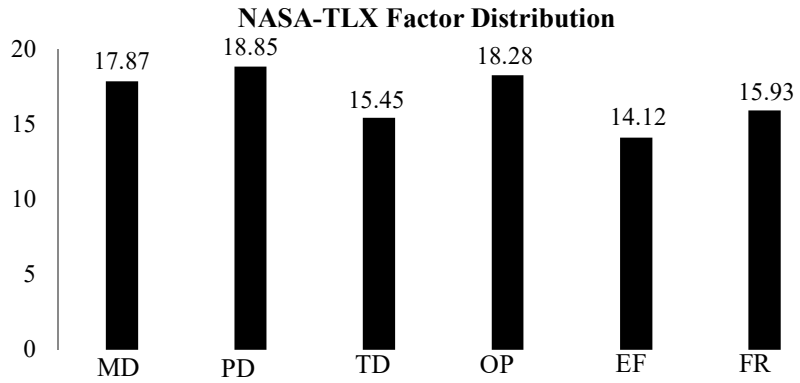

Figure 1. Distribution of NASA-TLX Factors

It is evident from the outcomes of the data processing and analysis that the NASA-TLX approach yielded that, of the six indicators, the Physical Demand indication had the greatest percentage, at 18.35%. This demonstrates that bodily demand is experienced by Dayah Daruil Mui'arrif Al-Aziziyyah students and santri. The independent sample t-test will be used in this study to determine whether there are any disparities in the mental health burden of students at Dayah Daruil Mui'arrif Al-Aziziyyah. A normality test is performed to determine whether the data from the two three-thousandth samples is distributed consistently. Since there are more than 50 samples in this study, a normalcy test using the Kolmogorov-Smirnov test is performed. With SPSS 26, the Kolmogorov-Smirnov normalcy test is performed. Additionally, there is the following normalcy test for gender, status, and class. Table 2 displays the findings of the gender-specific normalcy test for pupils at Dayah Daruil Mui'arrif Al-Aziziyyah

Table 2. Gender normality test

		Tests of Normality					
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	sex type	Statistic	df	Sig.	Statistic	df	Sig.
Loading result to spin	Man	.159	28	.069	.908	28	.018
	Woman	.158	28	.072	.914	28	.025

The results of further testing on data homogeneity using SPSS 26 can be seen in Table 3.

Table 3. Test of homogeneity of variances

		Levene Statistic	df1	df2	Sig.
Spinning load results	Based on Mean	.062	1	54	.805
	Based on Median	.106	1	54	.746
	Based on Median and with adjusted df	.106	1	53.848	.746
	Based on trimmed mean	.056	1	54	.814

The results of further testing on the comparison of average mental load scores also using SPSS 26 can be seen in Table 4.

Table 4. Independent sample test

	Levene's Test for Equality of	1-test for equality of Mens

		Variances								
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig.(2-tailed	Mean Difference	Std.Error Difference	Lower	Upper
Metal load results	Equal variances assumed	.062	.085	.966	54	.338	6.357	6.582	-6.839	19.553
	Equal variances not assumed			.966	53.610	.338	.6357	6.582	-.6.841	19.555

The independent sample t-test in Table 4 of the SPSS output indicates that there is no difference in the average mental load of male and female students, with a value of Sig = 0.805 > 0.05 indicating that H0 is accepted. Additionally, using SPSS 26, the normalcy test of students' mental load based on Status was conducted. Table 5 displays the test's results.

Table 5. Status normality test

Test of Normality							
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Status	Statistic	df	Sig.	Statistic	df	Sig.
The results of the mental burden of students	Student	.146	35	.057	.923	35	.017
	Manager	.186	21	.057	.878	21	0.13

a. Lilliefors Significance Correction

The results of further testing on the homogeneity of mental load data based on Status using SPSS 26 can be seen in Table 6.

Table 6. Status homogeneity test

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig
The results of the mental burden of students	Based on Mean	.026	1	54	.872
	Based on the Median	.101	1	54	.752
	Based on the Median and with adjusted df	.101	1	53.963	.752
	Based on trimmed mean	.030	1	54	.864

The results of the next test on the comparison of the average of the mental load scores also using SPSS 26 can be seen in the following Table 7. For the Independent Test

Table 7. Independent sample test status

		Levene's Test for Equality of Variances		1-test for equality of Mens						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig.(2-tailed	Mean Difference	Std.Error Difference	Lower	Upper
Metal load	Equal variances	.062	.872	1.133	54	.262	7.677	6.776	-5.909	21.262

		Levene's Test for Equality of Variances		1-test for equality of Mens					
								95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig.(2-tailed	Mean Difference	Std.Error Difference	Lower	Upper
results	assumed									
	Equal variances not assumed			1.165	46.005	.250	7.677	6.588	-5.584	20.938

Table 7 shows that there is no difference in the average mental load of male and female students, with the Sig value = 0.872> 0.05 indicating that H0 is accepted. This is the result of the independent sample t-test conducted using SPSS 26 software. Table 8 displays the findings of the Keilas Normality Test, which was conducted using SPSS 26 to determine the mental load of the students

Table 8. Class normality test

	kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
results of the spinning of the students' labor	mubtadi	.197	24	.067	.874	24	.006
	tsanawiyah	.260	11	.076	.896	11	.166
	aliyah	.119	21	.200*	.935	21	.171

The results of further testing on the homogeneity of mental load data based on Class using SPSS 26 can be seen in Table 9.

Table 9. Class homogeneity test

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig
The results of the mental burden of students	Based on Mean	1.589	2	53	.214
	Based on Median	1.908	2	53	.158
	Based on Median and with adjusted df	1.908	2	43.461	.161
	Based on trimmed mean	1.597	2	53	.212

The results of further testing on the comparison of the average mental load scores based on Class using SPSS 26 can be seen in Table 10.

Table 10. Independent sample test results

	Levene's Test for Equality of Variances		1-test for equality of Mens						
								95% Confidence Interval of the	

		F	Sig.	t	df	Sig.(2-tailed	Mean Difference	Std.Error Difference	Difference Lower	Upper
Metal load results	Equal variances assumed	4.844	.035	-.965	33	.337	-8.502	8.548	-25.839	8.890
	Equal variances not assumed			-1.079	23.939	.291	-8.502	7.878	-24.763	7.759

Table 10 presents the findings of the independent sample t-test using SPSS 26 software. It indicates that the average burden of student learning varies depending on the muibtadi, tsanawiyah, and aliyah classes. The Sig value = 0.035 <0.05 indicates that H0 is rejected.

Discussion

It is evident from Table 1's NASA-TLX calculation results that students at Dayah Daruil Mui'arrif Al-Aziziyyah have varying degrees of mental workload. 51 percent of the 56 students who responded indicated they had a high mental load, with an average value range of 50–79, while another 13 percent said they had a very high mental load, with an average value range of 80–100. Of the students, up to 25% thought their mental load fell into the low category, which had a value range of 10-29, and 13% thought it fell into the moderate category, which had a value range of 30-49. With a rating range of 0 to 9, no student reported having a very low mental burden. This demonstrates that most students have a good amount of mental load, which might have an impact on their quality of life and academic achievement.

Physical Demand, with a percentage of 18.35%, was the factor that most contributed to mental strain according to the NASA-TLX factor distribution analysis. This suggests that a large number of students suffered from severe physical exhaustion. Furthermore, statistical analyses utilizing the independent sample t-test revealed no significant difference in the average mental load between students and administrators of Islamic boarding schools (Sig = 0.872 > 0.05) or between male and female students (Sig = 0.805 > 0.05). Class level, however, showed a significant difference (Sig = 0.035 < 0.05) in the mental strain faced by students in the aliyah, tsanawiyah, and muibtadi classes. This discrepancy could be brought about by the fact that every educational level has distinct obligations and varying academic demands.

4. CONCLUSION

Evidence from Dayah DMA research indicates that students—both at religious educational institutions and in colleges—face considerable mental challenges when learning in two distinct settings. Out of the 56 participants in the analysis, 50% of the students reported having significant mental burdens. The primary element influencing mental load was physical demand, which accounted for 18.35% of the total. There was no variation in mental load according to gender or student status, according to the findings of statistical tests using the independent sample t-test with the SPSS version 26 tool. Nonetheless, there was a notable variation in the mental load according to class level, suggesting that students' mental loads differed dependent on their educational attainment. This study reveals areas that need greater effort to improve students' well-being and offers a deeper knowledge of the elements influencing their mental burden.

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