

A Ruler of Critical Thinking of Muslim Students: the role of Quran Recitation and Sunnah Food Consumption

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Abstract: Graduates are believed to lack in the critical thinking ability particularly when this skill is one of the important criteria for employability. However, this is just a claim made without an empirical evidence. This prompted the conduct of this study that measured the level of critical thinking among students from renowned universities in Malaysia and Indonesia. Two variables have been added to verify that critical thinking level of a Muslim student has been contributed by Quran recitation and sunnah food consumption. Out of 290 students who participated in the survey via google form, 59.8% were from Indonesia and 40.2% from Malaysia. Rasch analysis was performed and the outcome generated comprised 5 groups with varying critical thinking levels. The first and second group are identified as high critical thinking (HCT) students because they are committed to recite the Quran and consume sunnah food. The third and fourth group (moderate critical thinking (MCT)) recite the Quran and consume sunnah food moderately, while the last group (low critical thinking (LCT)) are those who recite the Quran the least and do not favour to eat sunnah food as their regular food intake. The findings revealed important insights concerning Quran recitation and sunnah food. The government of the two countries should pay serious attention on the two variables if they wanted to enhance critical thinking of tertiary education students. It is recommended that if many studies were performed similar in nature to this study, then there is adequate proof to suggest both Quran recitation and Sunnah food consumption as stimulant and reinforcer of the critical thinking skill. Additionally and most importantly for Muslims, the two components are able to generate deliverables in the form of quality worship to Allah and His messenger, the Prophet Muhammad p.b.u.h.

Keywords: Critical thinking, Quran recitation, Sunnah food, Rasch analysis

1. Introduction

University students in Malaysia were reported to have poor thinking skills. Graduates students were also claimed to poorly meet the demand of the industry (Azmi, Kamin&Noordin, 2018). One of the demands was critical thinking (Hussin, Harun & Shukor,

2019; Rodzalan&Saat, 2015). As in Rodzalan and Saat (2015), a survey conducted by Manpower Group (2012) reported that employers were not satisfied with graduates' capability to solve complexity. In addition, Indonesian students are believed to have low critical thinking levels too. Hence, this has

been the focus of researching, worldwide, in the area of education.

Rodzlan and Saat (2015) agreed that university students need to equip themselves with critical thinking and problem-solving skill as these are the focus of employers when hiring people. This is because they believe that high critical thinking skills will provide students with the ability to enhance communication, reasoning and decision making.

As both UiTM (Malaysia) and UNTAG (Indonesia) can be considered as entrepreneurial universities, they may have been expected by industries to produce students with high level of critical thinking and problem-solving skills. This is because an entrepreneur needs to have among others the following criteria, namely predictive; analytical; and applied. These are also the criteria of critical thinkers. This has been supported by Scriven and Paul (1987) who described critical thinking as an intellectually disciplined process. In the process, an individual actively and skilfully conceptualize, apply, analyse, synthesize, and/or evaluate information that are generated from observation, experience, reflection, reasoning, or communication. This process guides the individual's belief and action.

In the university, critical thinking is essential to fulfil students' assessment criteria. In turn, this ability is associated with employability and academic achievement (Facione, Facione & Giancarlo, 2000). By developing critical thinking in the graduates, universities are helping to enhance innovation in the workplace and the community at large (Davies, 2011).

Among the factors identified to affect critical thinking are self-motivation (Kong, 2014; Bensley, 2008; Roberts & Dyer, 2005; Semerci, 2011), background knowledge (Saaris, 2016; Zwaagstra, 2011; Ali, 2016; Gee, 2012), social context (Lun, 2010; Oda, 2010; Mohamad, 2008), and family background (Arsyad, 2012; Landry, 2014). Unfortunately, those studies are not comprehensive; they are fragmented or disunified. Actually, both the characteristics and cognitive thinking behaviours should be combined in one study so that a better model

can be developed to improve critical thinking in students. The fragmentation may be due to lack of better tools to compare characteristics against norms, and cognitive thinking behaviours. Therefore, this paper responds to this and attempts to fill the gap. In addition, a ruler will be developed to measure the critical thinking level of students after putting together the criteria and the behaviours. Since this study was conducted among Muslim students, and Muslim behaviours are much influenced by their faith and commitment in the religion (Alam et al., 2011), two new variables that are related to Islamic practices are added. They are Quranic recitation (Shekha, Hasssan and Othman, 2013; Darabinia, Gorji & Afzali, 2017; Samhani & Reza, 2019; Kamal et al., 2013; Abdel-Maguid & Abdel-Halim, 2015) and Sunnah food consumption (Salim, 2014; Sayyid Qutb, 2003). This is because both Quranic recitation and Sunnah food (or healthy food) consumption are stated in the Quran and hadith as deeds that are believed to purify the heart of the believer (Sayyid Qutb, 2003). For this study the Rasch analysis is employed to 1) measure the level of critical thinking according to certain criteria; 2) classifying groups of different critical thinkers by characteristics and behaviours; and 3) identifying items (criteria) that differentiate one group of students with other groups.

2. Research Methods

This research is of the type descriptive cross-sectional study, which aims at describing and comparing the characteristics between Muslim students from Malaysia and Muslim students from Indonesia. Specifically, we are looking at how they respond to items concerning critical thinking (CT), Quran recitation (QR), Sunnah food (SF), background knowledge (BK), and self-motivation (SM). In turn, we want to know how those characteristics affect the way they respond to items concerning CT.

2.1 Sampling and data collection

Since the size of the population was hardly determined, the sample size was finally

decided by using the G-Power, that is, taking into consideration the type of analysis conducted; the effect size; and the probability error and power. Based on the given parameters, the sample size identified was 198 (99 for each country). In order to get a higher number of responses, 500 questionnaires were distributed to students of both countries by using google form and disseminated via WhatsApp and email. For this study, students of UiTM, Malaysia and students of UNTAG, Indonesia were selected due to their similarities in terms of culture and orientation. Both universities were established in 1957, and both are entrepreneurial university aiming to equip students with entrepreneurial skills. What were different was the food they consume and the level of Quran recitation. Muslim Indonesian students are believed to be more concern about religion and have a culture of eating vegetables “ulamulaman”, fruits and plain water. On the other hand, Malaysian students particularly those staying in the towns prefer to eat fast food. Therefore, we anticipate the different levels of critical thinking according to the different food they take. Based on these criteria, UiTM and UNTAG were selected for this study. 390 questionnaires were administered, but only 291 questionnaires were useful. In fact, 291 was larger than the suggested sample size.

2.2 Data analysis

Rasch analysis was used to achieve the objective of this study. Rasch is able to measure an individual student's location on a logit ruler based on how the student responds to the item(s) of selected construct(s) in the questionnaire. This will determine the level of critical thinking of the student. Thus, Rasch Measurement Model is a model that looks at the probability of correct response to an item. This is illustrated in the following equation (Wright & Mok, 2004):

$$P(\theta) = \frac{e^{\beta_n - \delta_i}}{1 + e^{\beta_n - \delta_i}}$$

where
 e is the Euler's number = 2.7183
 β_n = person's ability
 δ_i = item difficulty

Additionally, Rasch analysis is capable of transforming ordinal data into ratio data by means of a ruler of “probability of event” that uses the logit (log-odd-unit) scale measurement. For example, a student who obtains 99% in a test is ranked as a capable

student. This also means that the student's probability of endorsing the item as a ratio is 99 to 1. Based on this explanation, the probabilistic ruler represents the probabilistic line diagram which is converted into the logit scale ruler via logarithmic calculation. The Rasch Measurement Model is based on two fundamental expectations (Greene & Frantom, 2002):

- A person who is more capable has a greater likelihood of endorsing all the items given but the less capable person can only endorse a few items correctly.
- An easier item (e.g. common practice) is more likely to be endorsed by all persons, but the most difficult item (unusual practice) is unlikely to be endorsed by all.

Rasch Model takes the responses given by respondents and creates a relationship with the items operationalizing a certain trait. The Rasch model assumes that item difficulty is the attribute that is influencing the person's responses, while the person's ability is the attribute that is influencing the item difficulty estimates (Linacre, 1999). In other words, a person's ability is very much closely related to the level of difficulty of an item.

The scale of measurement used in Rasch, called the logit (log odd unit) is an equal interval scale converted from the logarithm of the probability of an event unidimensional. A person who has the same ability logit scale as the item's difficulty level is assumed to have a 50:50 chance of endorsing the item. In other words, Rasch estimates the item difficulty as the 50% probability of a student of a given ability endorsing the difficult item. With the item mean set at zero logit, items which have a mean of above average (greater than zero logit) are recognized as more difficult items. On the other hand, items with a mean of below average (less than zero logit) are recognized as easier items.

Since Rasch accounts for the relationship between a person's capability and item difficulty, it is appropriate to refer to the person fit and item fit. A person fit means that the respondent can be identified as being able to provide a correct response or a wrong response to an item of a certain difficulty level. An irregular or erratic response which

does not display a pattern of a correct response may be a sign of a misfit.

Meanwhile, an item fit refers to an index that indicates the functionality of an item. A misfit item means that the item is not really testing on the desired latent trait. Having a misfit item in a test or questionnaire can lead to the likelihood of having an instrument which is non- unidimensional.

3. Results And Discussion

Based upon the descriptive statistics, it was found that 59.8 percent of the respondents were students from UNTAG, Indonesia, while 40.2 percent were students from UiTM, Malaysia. A majority of the respondents were female (73.5%) indicating the population of both countries a majority of whom are female. 37.8 percent were from part 5, followed by 28.9 percent from part 3. The least was from part 2 (0.7percent). Next, majority of them

were from the faculty of business management (72 percent). Before a Rasch ruler was produced (output Table 12 of Rasch analysis), the determination of goodness fit of data was necessary. This was identified after checking for item and person reliability, item fit, and uni-dimensionality. The following are the discussions about them.

3.1 Determination of goodness fit of data

Table 1 shows the summary statistics extracted from Output Table 3.1 of Rasch Analysis. The highlighted items are the important elements to be interpreted. Person reliability of 0.94 indicates that there were excellent numbers of items to differentiate students' ability. Next, item reliability of 0.97 indicates that there were excellent numbers of students to differentiate items' difficulty.

Table 1: the summary statistics produced from Output table 3.1 of Rasch analysis

ITEM		TOTAL SCORE	COUNT	MODEL MEASURE	S.E.	INFIT		OUTFIT		
						MNSQ	ZSTD	MNSQ	ZSTD	
	MEAN	192.1	55.0	.55	.16	1.01	-.4	1.01	-.4	
	P.SD	27.1	.2	.69	.03	.60	2.9	.59	2.8	
	S.SD	27.2	.2	.69	.03	.60	2.9	.60	2.9	
	MAX	270.0	55.0	3.87	.45	4.61	9.9	4.62	9.9	
	MIN	93	54	-1.63	.14	.19	-7.0	.21	-6.8	
	REAL RMSE	.17	TRUE SD: .67		SEPARATION: 4.02		PERSON RELIABILITY: .94			
	MODEL RMSE	.16	TRUE SD: .67		SEPATATION: 4.25					
	S.E. OF PERSON MEAN= .04ITEM RELIABILITY: .97									
PERSON	PERSON RAW SCORE-TO-MEASURE CORRELATION = .93									
	CRONBACH ALPHA (KR-20) PERSON RAW SORE “TEST” RELIABILITY =.94 SEM=6.65									
		TOTAL SCORE	COUNT	MODEL MEASURE	S.E.	INFIT		OUTFIT		
						MNSQ	ZSTD	MNSQ	ZSTD	
	MEAN	874.5	249.9	.00	.07	1.00	-.2	1.01	-.1	
P.SD	93.3	.8	.46	.00	.26	2.9	.26	2.8		
S.SD	94.1	.8	.46	.00	.26	3.0	.26	2.9		
MAX	1076.0	250.0	1.32	.09	1.71	6.8	1.87	7.6		
MIN	593.0	244.0	-1.15	.07	.58	-5.8	.59	-5.4		

Source: generated and reproduced from Output Table 3.1 of Rasch analysis

Person separation score of 4.02 indicates that there were 5 classifications of students separated by four (4) lines which were determined by the location of students on a logit ruler (generated from Output Table 23.0 of Rasch analysis) against the location of certain items that must be located at par and lower than the location of students on the same logit ruler. The Cronbach alpha value of 0.94 indicates that there were excellent inter-items consistency. The precision of the measures can

be seen from the value of Model RMSE (.16) which was not so much different from the real RMSE (.17).

Table 2: The results of Uni-dimensionality test

	Eigenvalue	Observed	Expected
Total raw variance in observations	81.8516	100.0%	100.0%
Raw variance explained by measures	26.8516	32.8%	32.7%
Raw variance explained by persons	7.4972	9.2%	9.1%
Raw Variance explained by items	19.3545	23.6%	23.6%
Raw unexplained variance (total)	55.0000	67.2%	100.0%
Unexplnd variance in 1st contrast	8.1072	9.9%	14.7%

Source: generated from output table 23.0

Table 2 shows the results of the uni-dimensionality test. This test was conducted to identify the uni-dimensionality of the constructs. The value of raw variance explained by the measure of 32.8 percent indicates that only 32.8% of the items measured the construct. As expected, there is a possibility that the construct was measuring other dimensions. This is because the construct consisted of items measuring variables other than items of critical thinking. It was purposely designed as such in order to see the responses of students on items measuring the factors against items of critical thinking.

3.2 Answering Research Objectives

In order to answer the first and the second research objectives (RO1: to measure the level of critical thinking by certain criteria & RO2: to classify groups of students by different critical thinking levels based on their agreement on the items) of this study, a descriptive analysis (from SPSS) was conducted and Rasch ruler (extracted from Output Table 23) was produced. As can be seen in Table 3, the mean score for critical thinking level of both students from Malaysia and Indonesia were almost similar. The mean score for critical thinking of both countries were considered high (mean score for Malaysian students: 3.67; mean score for Indonesian students: 3.61). However, based upon a ruler generated by Rasch analysis as shown in Figure 1, a detailed description of the similarities and differences between them were shown. The ruler also has its logit scale to measure students' critical thinking levels.

Table 3: descriptive statistics

	Country	N	Mean
Critical_Thinking	Malaysia	117	3.6667
	Inonesia	174	3.6165

Source: results generated from SPSS

The Rasch ruler shown in Figure 1 measures the critical thinking skills of students of both countries. Their critical thinking levels were determined by the distance (in logit unit) between the location of a group of students against the location of items that were mapped side by side on the ruler. On the left side of Figure 1 were the persons (respondents of both countries) and on the right side were the items (questions on critical thinking (CT), recitation of the Quran (RQ), Sunnah food consumption (SF), background knowledge (BK), and self-motivation (SM)).

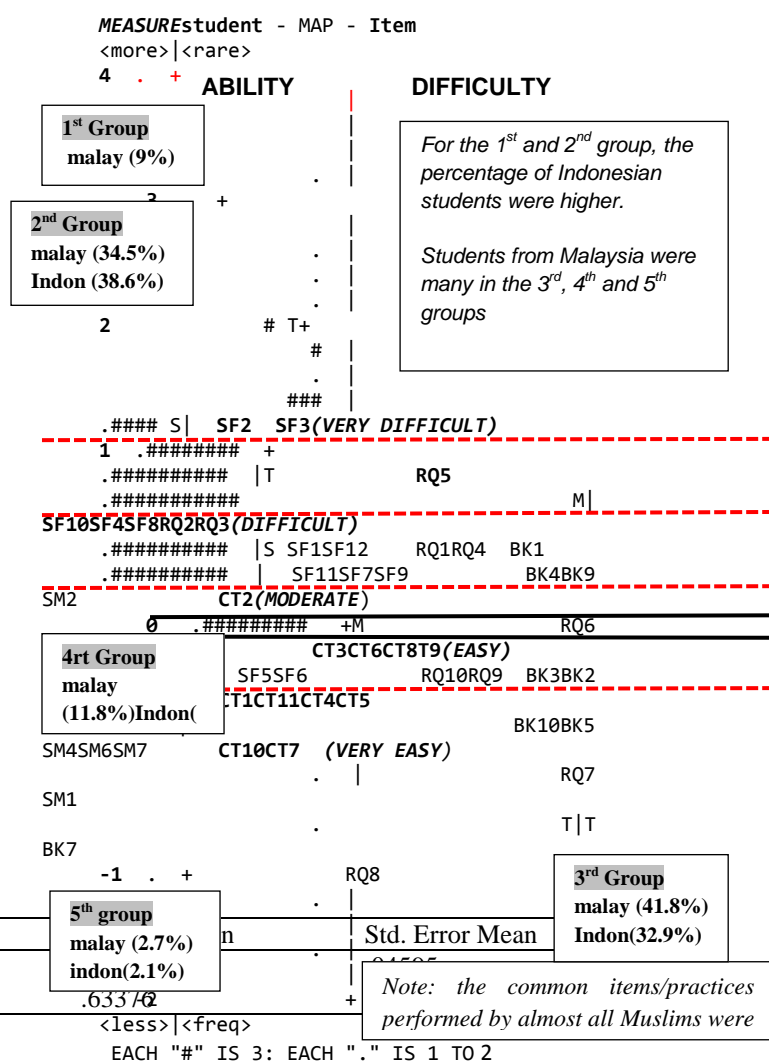


Figure 1: critical thinking ruler generated from Rasch analysis

3.2.1 Group determination and identification

With reference to Figure 1, there are 5 groups of students whom were divided by the 4 dotted red lines. The lines were determined by the group of items that are located below the location of students on the left side (to reflect their level of agreement on the items which also reflect their ability to perform the activities). Students whose level of agreement on certain items that are almost similar were grouped together. Their level of agreement on the items was determined by the distance with regards to the location of the students (in logit unit as indicated by *MEASURE* shown in Figure 1). This means the further below the items' location (in logit) from the students' location (in logit), the stronger a person's agreement on the item(s). This also indicates their ability to perform those items. On the other hand, the closer the students' location from the items' location, the lesser a person's agreement on the item(s), indicating less ability. Therefore, items that are located higher on the ruler are difficult items. Likewise, items that are located lower on the ruler are easy items (these items were performed by majority of the students). Therefore, the items labelled *SF2(taking dates and raisins daily)*, *SF3(drink honey every morning)*, *RQ5(drink 8 glasses of plain water daily)*, *SF10(never skip breakfast)*, *SF4(eat nuts)*, *SF8(eat fruits before meal)*, *RQ2(recite Quran with translation)*, and *RQ3(never miss reciting Quran in a day)* are difficult items. Students who agree on those items are students with high ability. Based on these indications, we can see some patterns of behaviour in the responses. It was observed that students who agree on the difficult items also agree very strongly on items of critical thinking. Likewise, for those who disagree on those items, this will not lead them to agree with the critical thinking items strongly. For this reason, the first and second group were ranked high on the ruler.

It is also interesting to highlight here that almost all students agreed with *RQ7(reciting Quran to feel Allah's advices)*, *RQ8(has been exposed to Quran since childhood)*;

BK5(know what and why I read), *BK7(interested listening to someone else's ideas)*, *BK10(feel successful after reading due to my effort)*; *SM1(I believe in what I do)*, *SM4(plunge into tasks with all my heart)*, *SM6(set high standard for myself)*, *SM7(always prepared)*; and *CT1(use creative approach to solve problem)*, *CT7(evaluating range of suggestions before choosing)*. This reflects the common practices performed by majority of the students. Performing items that are difficult have put them higher on the hierarchy. In addition, compared to items of critical thinking, those who performed *RQ1-RQ5(RQ5. I will refer to IbnuKathir's translation for a better understanding of a verse every time reciting)*; *RQ2. I recite Al Quran with the translation*; *RQ3. I never miss reciting the Holy Quran in a day*; *RQ1. I recite Al-Quran daily*; *Q4. If I found difficulty in understanding a learning material, I would increase the number of pages in my recitation of Al Quran*) would respond easily to the difficult items of background knowledge *BK1-BK4(BK1. I prefer to read before going to class so that I can follow what will be discussed)*; *BK2. I keep myself update with current knowledge of my area of interest*; *BK3. (I love listening to different views from scholars as that would help me to increase my knowledge*; *BK4. I always do a self-reflection after reading)* *BK8(BK8. After reading I seek additional information from outside sources)*, *BK10(BK10. After reading I feel successful due to my effort, not a result of luck)* and critical thinking items of *CT2(CT2 In carrying out my day-to-day work, I tend to see pattern in solving problems where others would see items as unconnected)*, *CT3(CT3 When suddenly asked to consider a new project, I am able to take an independent and innovative look at most situations)*, *CT8(CT8 In carrying out my day-to-day work, I can usually find the argument to deny unsound propositions (i.e. propositions that contain invalid facts)* and *CT9(CT9 If I am suddenly given a difficult task with limited time and unfamiliar people, my feelings seldom interfere with my judgement)*. This reflects the fact that for someone to be critical, he or she needs to perform *RQ1-RQ5* first which lead to better performing of *BK1, BK4, and BK9*.

Based on the location of items of Sunnah food and Quranic recitation

(considered difficult items since majority students located below the location of these items) against the first group, it appears that students who belong to the first and second group are critical thinkers (because they agreed to almost all the critical thinking items very strongly). This is because they consume the Sunnah food seriously, and they recite the Quran by understanding the context of the verses and memorize the verses. This can be seen from the location of the group that is above the location of all items which indicates their level of agreement on the items. However, the second group found some items (practices: SF2 and SF3 and R5) that were difficult to agree with because they did not practise SF2, SF3 and R5, and were about 50% confident with items SF10, SF4, SF8, R2 and R3 (in Rasch ruler, items located at par with the location of persons indicate a 50% agreement level (neutral or agree moderately)). All other items were easy to agree with.

In order to answer the third research objective (RO3: Identifying items (criteria) that differentiate one group of students with the other group), an analysis of the patterns of responses with items belonging to different variables and the interaction between these items was observed. The observation is displayed in Figure 1.

3.2.2 Group with student identification, their practices and their critical thinking level

With reference to Figure 1, notice that the groups were further divided, this time by four (4) bold lines. These four bold lines were simply drawn based on the critical thinking items. Based on these new divisions, the first, second and third groups were put together under one group as they are considered to have the highest level of critical thinking. In other words, they agreed to all the critical thinking items, but with different levels of agreement. The first and the second agreed to all the critical thinking items very strongly, while the third group agreed to all the items moderately. Based on Table 5 and Figure 1, the critical thinking level of students from these three groups was between 0 and 4 logit. The fourth group consisted of students with two different levels of critical thinking because some students from this group found **CT3 (take**

independent innovative look whenever asked to consider a new project), **CT6 (will make critical discrimination between alternative in seeking satisfaction through my work)**, **CT8 (usually find argument to deny unsound propositions)**, and **CT9 (if I am suddenly given a difficult task with limited time and unfamiliar people, my feelings seldom interfere with my judgement)** as moderately easy, while some others found the items difficult and did not agree with the items. The critical thinking level of the fourth group were -0.4 to -0.1 logit. Students from the fifth group disagreed with almost all the critical thinking items. Their critical thinking level were below -0.4. The standard ruler of Rasch is on the scale between 2 logit and -2 logit. Therefore, if someone's critical thinking is at 4 logit, this is considered above the highest scale of the standard Rasch ruler 2.0 logit. The lowest was at -0.4 logit which did not reach the lowest scale of a standard Rasch ruler -2.0 logit. Hence, based on this ruler, it can be concluded that the critical thinking level of Muslims students from the two countries were high.

Interestingly, students who agreed to almost all the critical thinking items responded positively to the difficult items of sunnah food and Quran recitation. What can be observed here is that if students were able to perform these items: *SF1 (I take food that has balance diet)*, *F7 (Most of the time I will take healthy food for every meal)*, *SF9 (Most of the time instead of following my desire on what to eat, I'd rather take what is good for my health)*, *SF11 (I am concerned about Sunnah food seriously because of its benefit to my physical, mental and soul)*, *SF12 (Even though some food taste bad if it is healthy I will eat it)*, *RQ1 (I recite Al-Quran daily)*, *RQ4 (If I found difficulty in understanding a learning material, I would increase the number of pages in my recitation of the Al Quran)*, *BK1 (I prefer to read before going to class so that I can follow what will be discussed)*, *BK4 (I always do a self-reflection after reading)*, *BK9, (Before reading something I activate prior knowledge)*, and *SM2 (I have more to contribute)*, they might have been able to develop their critical thinking skill even better.

4. Discussion

Past researchers (Kong, 2014; Saaris, 2016; Ali, 2016; Oda, 2010; Landry, 2014) suggested that factors that contribute to critical thinking are background knowledge and self-motivation. Nonetheless, the teaching of Islam about life that encourages Muslims to recite the Quran and consume healthy food so that at the end of the day there is quality submission to the will of Allah, is believed to enhance the cognitive skill of humans. As Quran recitation is much more than plain memory recite, the cognitive skill is obviously utilized during the recitation. As thinking process is involved, critical thinking is applied particularly when there is reflection towards the end, by the reciter. A happy ending may entail, that is, when the reciter turns over a new leaf. There is precedence of past research works by Sekha et al. (2013), Salim (2014), and Samhani and Reza (2019) who investigated the effects of Quran recitation and Sunnah food on the human brain. However, those studies did not specifically look into the impact on critical thinking. Sayyid Qutb (2003), in particular, related about both sources having positive association with the human brain, in the Quran.

As expected, the findings of this study have supported what has been claimed by Abdel-Maguid and Abdel-Halim (2015) regarding the impact of the Quran on thinking. In other words, those who recite the Quran also have the initiative to understand what the Quran talks about. As the Quran contains the words or sayings of Allah, those who take the initiative to understand what they are reciting will relate this understanding to their personal life. When they have decided to turn over a new leaf, this reflects that initiative. Hence, there is evaluation involved in the thinking process; this is critical thinking. The reciter has been involved with deep thinking or *Taffakur*. A chain reaction has transpired as a result of Quran recitation. Firstly, a person recites the Quran, next, he reads the translation and interprets it. Next, he

reflects upon himself. Finally, he makes judgment to turn over a new leaf. During the thinking process, that is, between interpreting and reflecting, there is evaluation being carried out; this is when critical thinking skill comes on. The lesson to learn here is that Allah guides the reciters on how to think. There is even a verse in the Quran that contains praises for people who think:

“Lo! In the creation of the heavens and earth and (in) the difference of night and day are token (of His sovereignty) for men of understanding. Such as remember Allah, standing, sitting, and reclining and consider the creation of heavens and earth, (and say): our Lord! Thou created not this in vain. Glory be to Thee! Preserve us from the doom of Fire”

(surah Ali Imran, 3:190-191).

This shows that Quran recitation can stimulate thinking and reflection in humans. Critical thinking skill is applied in this cognitive process. The Quran is a book which contains the words of Allah. As it is not easy to comprehend the words of Allah, Muslims have to enrol in formal classes to master the *tajwid* grammar and pronunciation of scriptures contained in the Quran. This is the rationale why the Prophet Muhammad p.b.u.h. facilitates understanding of certain contents of the Quran by simplifying the meanings through his behaviour and sayings. In the real world, Quranic recitation has been suggested by Darabania et al. (2017) to be used by organizations if they wanted their employees to have positive emotions and psychological comfort. The reason being, according to them, listening to Quran recitation by someone else alone, can improve the mental state, what more if the recitation is done by oneself. The findings of this study can be regarded as evidence on what has been claimed by Ghillan (2012) that Quran recitation can stimulate the brain to think effectively. This is because Quran recitation technically activates the brain by several actions. One of it is through a

continuous recital of verse with proper elocution (*tajwid*) leads to the activation of certain areas of the brain which ease the act of comprehension, processing and retention under all capacities. Therefore, if the Quran could improve our brain, this helps to enhance thinking skill, too. The findings have proven that the critical thinking level of a Muslim depends on how well someone recites the Quran, and how often and how far someone attempts to understand the Quran. The impact is indicated by how effective, deep and extensive the Quran recitation has been that have enabled students to be divided into the different hierarchies.

In order to have healthy brain that works effectively, it must not only be activated by recitation of the Quran, the cells or neurons in the brain must also be fed with adequate supplements. The Quran has mentioned about the importance of good food which is healthy or sunnah food to be consumed at sufficient level so that our heart and brain can function well. This functions to provide quality worship to Allah and His messenger, the Prophet Muhammad p.b.u.h., as suggested by Sayyid Qutb (2003) and Salim (2014). From the findings of studies, it is obvious that consuming or eating dates; raisins; nuts; and seeds; as well as sufficient water are difficult for students to do, except for those who possess high critical thinking level. No doubt what has been recommended by Allah to His creation (i.e., humans) as stated in Al-Baqarah verse:172) which roughly means "*O ye who believe! Eat of the good things; What we have bestowed you*" is meant to bring benefit to the human body.

This research also supported the research works of (Lun, 2010 and Oda, 2010; Kong, 2014 and Semerci, 2011) who claimed that background knowledge and self-motivation are important. The variables, both background knowledge and self-motivation, as characteristics of most students with high critical thinking level indicate that these are among the reasons for someone to have a critical mind. However, both Quran recitation and sunnah food appear to be much more effective in stimulating thinking and critical thinking compared to background knowledge and self-motivation. This clearly suggest that Quran recitation and sunnah food consumption can help to reinforce self-motivation, and

comprehension and critical thinking skills when reading any printed materials. Future research can be undertaken to prove that these benefits hold by conducting many experiments of the same nature as this research.

5. Implication

The ruler produced in this study has provided important insights into the importance of Sunnah food and Quran recitation. Self-motivation and background knowledge have been acknowledged as factors that can influence critical thinking. The present study has proven this too. Additionally, food consumption and Quran recitation have proven to be more impactful, as food intake provides nutrition to the whole body where the brain is the most important part that helps the body system to function well. The Quran recitation can stimulate the brain to function well and improve memory as suggested by Sekha et al. (2013), Samhani and Reza (2019) and Kamal et al. (2013). However, for the brain to work effectively and efficiently, it depends on adequate nutrition from the food (Amrullah, 1998 & Sayyid Qutb, 2003). Therefore, the ruler can be the best tool to measure the critical thinking level of Muslim students by the way they consume their food; the way they recite the Quran; their level of self-motivation; and the way they seek knowledge.

6. Conclusion and Recommendation

Previous studies have suggested that background knowledge and self-motivation are some strong factors that influence the critical thinking levels of students in many places of the world. However, those factors may not be adequate to explain the critical thinking levels of Muslim students. This is because a Muslim's way of life is different from people of other religions. In Islam, reciting the Quran regularly and consuming good healthy food are two religious deeds that are consistently practiced by committed Muslims. In fact, through research, reciting the Quran and consuming healthy food have been proven to provide benefits to the brain. The researchers experimented on the effect of Quran recitation on the brain by using EEG and FFT. A famous Muslim scholar also emphasizes the importance of consuming

healthy food as this habit has been commanded in the Quran. For the above two reasons, these two variables were added to the other variables proposed by conventional research in the context of the current study.

The variables 'self-motivation' and 'background knowledge' were selected to determine whether students with different levels of achievement responded to these variables better than Quran recitation and Sunnah healthy food consumption. The different levels of achievement are determined by their response to the critical thinking items. Rasch analysis was used to analyse the data collected from both universities via google form. After taking all measures into consideration, the analysis was carried out and the results proved that healthy food and Quran recitation explain critical thinking by looking at the location of these two sets of items. Healthy food and Quran recitation are difficult items and only those who agree with the critical items strongly will agree with the researchers.

The ruler has divided Muslim respondents into 5 groups based on the way they responded to the items (i.e. level of agreement). What can be learned from this ruler is that universities should encourage students to consume healthy food everyday by allowing only healthy food to be served in food outlets located on campus. In addition, before a lesson starts in the classroom, it is encouraged that a short chapter of the Quran be recited everyday by students along with a brief explanation of the chapter. A campaign on eating sunnah food and reciting Quran should be conducted to help students be aware of the positive effects it gives to their brain and soul. After that, a longitudinal study can be conducted before and after the 6 months of regular recitation of the Quran and the consumption of sunnah food so that the effect can be seen more systematically and effectively.

This finding has provided a good foundation to further investigate the effect of Quran recitation on critical thinking in the future by using different measure of critical thinking that test the ability of students to analyse and evaluate specific cases which requires certain level of thinking rather than asking their perception on the way they solve problems. This is because using marks for the

ability will be more accurate as it provides variations of results which reflect their ability.

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