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Submission date: 04-Jul-2020 01:52PM (UTC+0700)

Submission ID: 1353304032

File name: Prosiding_YSSSEE_IOP_Scopus.pdf (722.16K)

Word count: 3623

Character count: 19701

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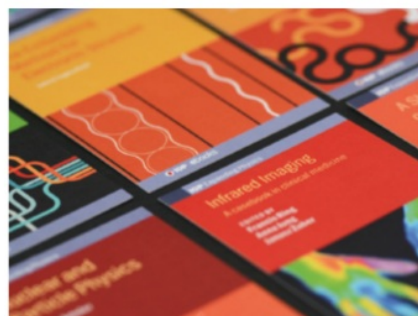
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To cite this article: H Sugilar *et al* 2020 *J. Phys.: Conf. Ser.* **1467** 012024

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The Correlation between Logic Ability, Mathematical Proof and The Holy Qur'an Recitations

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Abstract. The purpose of this study is to measure the ability of logic and mathematical proof of students through logic problems, proof. To measure the ability of logic in addition to the logic test also by testing the ability to memorize the Holy Qur'an (tahfidz). This research method is a quantitative method measuring the ability of logic and mathematical proof of mathematics education study program students. The subjects of this study were 47 students of mathematics education at one of the tertiary institutions in Bandung who were finishing their thesis and memorizing the Holy Qur'an juz 30. The instruments used consisted of logic questions, proof questions, tahsin and tahfidz assessment forms, and questionnaires. The results showed that the mathematical proof ability was in the low category while the logic ability was in the sufficient category. Ability of tahsin and or tahfidz in either category. Students respond to both tahsin and tahfidz activities and do not object to the obligation to memorize the Holy Qur'an juz 30. The low ability of proof is caused by students not practicing proving questions, difficulty in completing because of the low understanding of theorems and forms of proof. There is a correlation between logical ability and mathematical proof, correlation between logical ability, mathematical proof with memorization of the Holy Qur'an. Mathematical proof ability can be trained by doing a lot of work or practicing proving questions, whereas logic ability can be trained by increasing brain activity for example memorizing.

1. Introduction

The ability of logic and mathematical proof is one of the assets to be able to solve mathematical problems. With good logic skills he will easily recognize, find solutions and solve problems well based on intuition and facts. The ability to think logically is an important basic skill. However, the facts show that students' logical thinking ability in mathematics is still low [1]. Students need to be equipped with these two abilities, one of them by providing logic questions and mathematical proofs on exam questions or assignments. Difficulty in proving because of poor understanding of statements. Not every statement can be proven need to analyze the statement before proving it [2]. There are

fundamental differences in the proving process between abstract algebra and real analysis, including the use of summations, difficult definitions, and familiarity of concepts [3]. The fundamental difference lies in the tightness of theorems, propositions, lemmas and definitions and objects of discussion. In the real analysis, the system of numbers and rows of real numbers is examined. While proof is central to mathematics, difficulties in teaching and learning of proof are well-recognized internationally [4]. Developing a logical argumentation of proof is a natural way of thinking through giving a problem, the process of proving this is a problem when mathematical evidence is introduced while learning takes place [5].

The ability of logic and mathematical proof need to be possessed well by students so that they are able to solve mathematical logic and proof of problems easily and can solve them well [6]. The intended logic ability is the ability to solve logic problems that require inductive or deductive reasoning. The ability of proof requires logic, because without having good logic skills a person will have difficulty solving the problem of proof. Proof questions or materials are not to be avoided or ignored especially high school students who generally will continue to the next level need to be equipped with both capabilities. The ability to build a proof school mathematics teacher is not only important for their own learning process, but also important to help their future students learn how to do evidence. Middle school teachers have difficulty in knowing where to begin evidence, using examples efficiently, using appropriate and efficient methods for constructing evidence, and defining the logic and structure of propositions to build evidence[7]. Of course this is a problem to look for a solution, prospective teacher students need to be prepared how to improve these abilities and to detect in advance what are the factors causing these difficulties.

One course that emphasizes the ability of logic and mathematical proof is real analysis. Most students don't remember forms of proof; students are not able to make mathematical proofs of contrapositive and contradictory forms; dominant students are not able to apply proof of counterexample form; according to students 92.5% stated that real analysis, feeling confused and difficulty in solving proving questions 65% of students did not understand the material well and gave a passive attitude [8] [9]. Problems faced by students in carrying out mathematical proofs are problems of reading and understanding mathematical proofs, proof of mathematical statement accuracy, direct and indirect proofs or by mathematical induction and developing mathematical arguments to prove or reject a statement [10]. The reasoning-and-proof activity must be the center of all students' mathematical experiences; many students face serious difficulties with this activity [11]. In this context evidence is a means of convincing oneself while trying to convince others [12]. The activity of memorizing the Qur'an is one of them activities that meet the requirements to build integral intelligence (holistic) which is a collaboration of three intelligences (intellectual, emotional, spiritual), so it needs to be studied more deeply in relation to the ability of mathematical logic students memorizing the Qur'an[13].

Emotional intelligence becomes a pressure point for the skills needed in 2020, efforts need to be prepared to build emotional intelligence skills given that these skills cannot be separated from other skills and need attention because having good emotional intelligence will behave well being able to work together, caring for others, and character. Mathematical values that exist in each course can build student character which includes an attitude of seriousness, conscientiousness, honesty, hard work, perseverance and others [14]. Character education is needed by students and requires role models and guidance in building student character. The guidance and testing of tahsin-tahfidz the Holy Quran is one of the right steps to create quality students and scholars. Guidance for tahsin and tahfidz the Holy Quran is a form of service provided by institutions to students. The main goal is to improve the quality of reading and memorization. The level of self-efficacy of the majority is in the medium category 82% (41 people), the level of motivation for memorizing the majority is in the medium category 54% (27 people). And 2013 UIN Maulana Malik Ibrahim Malang memorizing students in 2013 showed that the majority of memorization achievement was in the moderate category of 82% (41 people)[15]. Student competence in reading the Holy Quran and writing texts through Tahsin activities can be improved, but these activities must be better planned so that learning

outcomes can be better [16]. The purpose of this study was to determine the mathematical proof ability and mathematical logic, who had been taking the tahsin and tahfidz programs in the units of tahsin and tahfidz institutions. Analyzing the correlation between the ability of tahfidz with the ability of logic and mathematical proof, the correlation between the ability of logic with mathematical proof.

2. Research Methods

This study uses a correlational type of research. The instruments used consisted of questionnaires, proving questions, questions, logic and tahsin-tahfidz assessment forms. The subjects of this study were 47 students at the end of the Mathematics Education Study Program who were completing a 30-year memorization of the Holy Qur'an one of the tertiary institutions in Bandung. The data of this study are in the form of logical ability test results, proof, tahsin-tahfidz values, and questionnaire results. The data that has been collected is then tested for correlation not yet in the regression test.

3. Results and Discussion

The significant difference between the skills needed in 2015 and 2020 lies in the ability of quality control and active listening in 2015 to become emotional intelligence and cognitive flexibility in 2020 which of course all of these skills need to be thoroughly prepared, regarding the design of appropriate devices in the form of models or instruments which encourages these skills, accuracy of setting goals, implementation to the evaluation of the achievement of these skills. One of the efforts in encouraging the formation of character is through the activities of fostering tahsin and tahfidz. The Tahsin program seeks to improve the ability to read the Qur'an while the Tahfidz have the ability to memorize the Holy Qur'an.

Table 1. Ability of tahsin and tahfidz students of mathematics education study program

Types	Tahsin	Tahfidz
Average	83,83	84,68
Standard Deviation	4,09	3,62

Based on table 1 shows that the ability of tahsin and tahfidz in both categories with an average of 83.83 for the ability of tahsin and 84.68 for the ability of tahfidz. Both of these abilities are inter-related abilities tahsin is the ability to read the Holy Qur'an well and correctly while tahfidz memorizes the Holy Qur'an . Students who have good knowledge will have an impact on the ability to memorize the Holy Qur'an well and easily memorize it. Next, the researcher wants to find out the student's proof and logic ability by providing logic and proof tests given that logic ability is the basis in solving mathematical problems while the proof ability needs to be possessed by students as the ability to analyze theorem proving or other types of proof

Table 2. Logic ability and proof of mathematics education study program students

Types	Logic Ability	Mathematical Proof Ability
Average	48.62	60.96
Standard Deviation	9.36	9.49

Based on table 2 shows that the average proof ability is 48.62 in the low or low category, while the average logic ability in the sufficient category is 60.96 with a standard deviation of logic ability is 9.49 and proof is 9.36. Prospective mathematics teachers have low levels of logical thinking skills and

critical thinking dispositions; Mathematical thinking skills of prospective mathematics teachers were upgraded from level two to level three while their critical thinking skills did not change much by grade level; a lower level of logical thinking ability than the others; Weak and negative directional correlations between mathematician candidates mathematical disposition of critical thinking and their logical thinking skills are clear [17]. Students need to be given reinforcement of the mastery of prerequisite material, conduct conditioning with exercises, exercises, and exercises, provide instructions with deductive proof instruction by stating definitions or theorems to do mathematical proofs. The process of proof is always given freedom about what procedures are carried out so as to prove mathematically not rigid and absolutely must do it like that but is open. Such an approach does not always support students through the creative reasoning process that they need if they are able to build a reasoned argument for themselves[4].

The ability of logic referred to in this study is the ability to solve the logic problems of impregnation, biimplication, conjunction, disjunction, and several potential academic questions about mathematical logic. Proof questions are in the form of real analysis courses. Difficulties experienced by students completing indirect proof or contradiction is due to confusion in making contradictory statements. To find out the relationship between logic ability and the proof of the Kolmogorov Smimov normality test, the value of the mathematical ability is obtained a significance value of 0.03 so that it can be concluded that the data is not normally distributed, while the value of the logical ability is obtained a significance value of 0.168 normal distribution data. Because one of the values of ability is not normally distributed the non parametric correlation test with the Spearman rho obtained the following results.

Table 3. Non parametric correlation tests of proof ability and logic ability

		Correlations		
			Proof Ability	Logic Ability
Spearman's rho	Proof Ability	Correlation Coefficient	1.000	.590**
		Sig. (2-tailed)	.	.000
		N	47	47
	Logic Ability	Correlation Coefficient	.590**	1.000
		Sig. (2-tailed)	.000	.
		N	47	47

Based on table 3, a significance value of 0.590 is obtained, the correlation between the ability of proof and logic is greater than 0.05 so it can be concluded that there is a correlation between the ability of proof and logic ability. This ability is measured based on the questions given to students with the specificity of the form of questions that have been validated by an evaluation expert. In principle mathematics is a tool for thinking and part of thinking is to play its logic in finding a solution or drawing conclusions based on known premises or statements. Logic-based learning is learning that directly uses abstract thinking. Furthermore, to find out the correlation between the ability of tahfidz with the ability of logic and proof obtained significance value data.

Table 4. Non-parametric correlation test for the ability of proof and logic for the ability of tahfidz

		Correlations		
			The ability of proof and logic	Tahfidz value
Spearman's rho	The ability of proof and logic	Correlation Coefficient	1.000	.279
		Sig. (2-tailed)	.	.058
		N	94	47
Tahfidz Value	Tahfidz Value	Correlation Coefficient	.279	1.000
		Sig. (2-tailed)	.058	.
		N	47	47

Based on table 4, a significance value of 0.580 is obtained, the correlation between the ability of proof and logic to the ability of tahfidz is greater than 0.05 so it can be concluded that there is a correlation between the ability of proof and logic ability with the ability of tahfidz. Students who memorize the Holy Qur'an juz 30 have a good logic and tahfidz ability, of course this can be the basis that students who memorize the Holy Qur'an 's logic ability is superior because there is an optimization of the use of the brain in its thinking activities. Understanding the Quran requires extensive knowledge and intellectual development at the stage of the Quran menghafal required concentration and focus to different hapalannya by memorizing lessons, memorize the Quran must be accompanied by a good reading ability (Tahsin) demands that in reading the Quran to be correct and appropriate. Memorizing the Holy Quran is a commitment stating one's efforts to worship Allah, because as Muslims, we believe that the Quran is the word of God, in memorizing the Qur'an, it must be met with accuracy and accuracy in articulating verses.

Table 5. Questionnaire results student attitudes towards mathematical proof and logic ability with the tahfidz program

No.	Statement	Yes (%)	No (%)
1	The Holy Qur'an memorization can help improve logic skills	65.4	34.6
2	The tahsin-tahfidz program helps shape character	78.5	21.5
3	The tahsin-tahfidz program understands the Qur'an well	94.2	5.8
4	the logic problem is more difficult than the proof problem	31.4	68.6
5	My logic ability is improved by practicing logic problems	58.3	41.7
6	I was very confused in working on the matter of proof	64.8	35.2

Based on table 5 attitudes toward mathematical proof, logic ability and the tahfidz program nearly 78.50% stated that the tahsin-tahfidz program can form characters, the logic problem is more difficult than the matter of proof 68.60% of students answered no. 65.4% of students answered that memorizing the Qur'an could help improve logic skills. 64.80% of students are confused in working on proving questions. Based on the questionnaire, it can be concluded that the ability of proof needs to

be improved, students need to be given more understanding about the steps in proving mathematically either direct, indirect proof, mathematical induction, counterpositive and so forth. Tahsin and tahfidz programs are needed by students in improving the ability to learn the Holy Qur'an or indirectly increase the ability of logic in connection with increasing the work of the brain through memorizing the Holy Qur'an. Students who memorize the Quran have better logic than those who do not memorize the Quran, but for the ability to prove there is no significant difference because the ability of proof requires special skills to understand theorems, postulates, definitions and propositions and the frequency of practicing proofs. The results reveal that there are significant differences in academic achievement before and after memorizing the Qur'an and have an impact on education and socio-cultural life [18].

4. Conclusions

Mathematical proof ability in the low category, logic ability in the sufficient category, and the character of students who have taken the tahsin and tahfidz programs in the tahsin and tahfidz institute units in the good category. There is a correlation between the ability of tahfidz with the ability of logic and mathematical proof, the correlation between the ability of logic with mathematical proof. Students respond to both the tahsin-tahfidz program, they need a tahsin and tahfidz unit in order to improve the ability to read the Holy Qur'an.

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