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DESCRIPTION OF MATHEMATICAL CREATIVE THINKING AND REASONING ABILITY OF SMP STUDENTS IN ISLAMIC CULTURE-BASED LEARNING

ABSTRACT: *Learning of Mathematics at the moment seems not to develop students' Mathematical thinking ability to the fullest. Therefore, it is necessary to find solutions to overcome these problems. The purpose of this research is to describe the ability of Mathematical creative thinking and reasoning; and to describe contribution of Islamic culture values to the ability of Mathematical creative thinking and reasoning. This research is qualitative research. The subject is the 8th grade students in SMP (Sekolah Menengah Pertama or Junior High School) Al-Irsyad al-Islamiyyah Purwokerto in Central Java, Indonesia; and six students who were selected as respondent. The results research is: (1) the students' ability of Mathematical creative thinking in the high academic achievement category can be said to be complete and very good, the students in the middle academic achievement category can be said to be fair good, deductive reasoning is dominant and creative thinking consist of fluency, originality, and elaboration. The students' ability of Mathematical thinking in the low academic achievement category can be said to be poor, inductive reasoning is dominant and creative thinking only consist of originality component; and (2) the implementation of Islamic culture value gives a positive contribution to "akhlak" or character building and effectiveness of thinking ability. "Tahfizh" or recitation of Al-Qur'an enhances students' Mathematical higher order thinking ability. The implementation of pray gives students' self confidence and discipline in solving Mathematical problem.*

KEY WORDS: *Mathematical creative thinking, Mathematical reasoning, Islamic culture-based learning, junior high school student, and quality of education.*

INTRODUCTION

The quality of education is not only measured by success in the cognitive realm, but the integration of cognitive, affective, and psychomotor. While there are schools that carried away with success in the cognitive, so that other domains are being neglected. Demands of today's society are starting to feel that the cognitive ability is not everything, so it must be balanced with the ability of the other, which has a good personality. So, what is needed now is a generation that has both intellectual and a good character.

Education is spearheading community expectations in producing a generation. Therefore, the attempt to realize the achievement of expected generation, educational institutions from primary level to

higher education need to do an evaluation and education process innovations. The business needs to be done to establish the character of the students, in order to produce graduates who really fit the expectations of society and the state. Character education is called upon by the President of the Republic of Indonesia since May 2010 has been rolling for review by education experts. Government policy towards the implementation of character education at all levels of education has been welcomed by the executive in the field of education. Apparently, the government's interest in character education in the hopes of a nation's character improvement, which is currently experiencing assessed decadence.

In line with government policy on character education, Islam has the concept of

character education which currently has not been developed. Education in Islam rests on character or religious spiritual. As the words of the Prophet Muhammad SAW (*Salallahu 'Alaihi Wassalam* or peace be upon him), "*I was sent to perfect character glory*" (narrated by Imam Malik in Hasjmy, 1993). This suggests that character development is an important factor in the underlying learning other sciences. Therefore, the concept of Islamic education, the intellectual, and the spiritual must go together (Bilgrami & Asyraf, 1989). The concept of Islamic education is in line with the national education goals as stipulated in the Act.

According UUSPN (*Undang-Undang Sistem Pendidikan Nasional* or Act of National Education System) No.20 of 2003, education is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing the potential for him to have the spiritual strength of religious, self-control, personality, intelligence, noble character, and the necessary ability themselves, society, nation and state (Depdiknas RI, 2003). Development potential learners are equipped in the Education Unit Level Curriculum (EULC) in 2006 that students from primary schools need to be equipped with the ability to think logically, analytically, systematically, critically, creatively, and ability to cooperate.

Specialized in Mathematics given to Junior High School students, aimed so that learners have the following capabilities: (1) Understand the concepts of Mathematics, explains the relationship between concepts and apply concepts or algorithms flexibly, accurately, efficiently, and appropriately, in solving the problem; (2) Using the pattern and reasoning to Mathematical manipulation in making generalizations, compile evidence, or explain Mathematical ideas and statements; (3) Solve problems that include the ability to understand the problem, devise a Mathematical model, solve the model, and interpret the obtained solution; (4) Communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem; and (5) Having respect for the usefulness of Mathematics in life, the curious, attention, and interest in studying

Mathematics, as well as a tenacious attitude and believe in solving the problem (Depdiknas RI, 2006).

However, the concept of education as outlined in Act of National Education System No.20 of 2003 is not yet fully understood by the managers in the field of education. It seems that the more education prioritizes academic achievement, thus neglecting the achievement of other goals. For example, people generally assume that the success of the achievements in the National Examination to measure the success of education in the schools. The result appears some people are less concerned about the learning process and the process of character education.

Based on these cases can be said that the learning of Mathematics at the moment seems not to develop students' Mathematical thinking ability to the fullest. Therefore, it is necessary to find solutions to overcome these problems. Likewise, basically every student has the potential for critical and creative thinking (Harris, 2004). The problem is how to develop that potential through a learning process in the classroom.

The strong urge to do revamping the educational process that can result in the generation of intellectual noble personality, it is necessary to research the schools that make efforts for the formation of a noble character. The study in question is the exposure of students' Mathematical thinking ability, especially in school-based Islamic culture has made efforts for the formation of the conditioning of the students of noble character.

Banyumas chosen as a research site, because the district has a population of 1,853,249 people and 98% are Muslim. Banyumas society is a society with a strong culture of Banyumas. Hence, the growing Islamic culture, it is possible to assimilate to the culture of Banyumas. This resulted in the strong cultural atmosphere of Islamic Banyumasan less visible, although the number of mosques in the district reached 1,747 and the number of buildings reaching 435 mosque building. In everyday life, it is more prominent is the culture Banyumasan than Islamic culture.

Banyumas society actually pays considerable attention to the study of Islam. It can be observed from the number of schools that based on Islamic school has now reached 244 schools. In addition, the schools came under the Ministry of Religious Affairs was also quite a lot that there are 171 Islamic elementary schools, 43 junior secondary school, and 13 *Madrasah Aliyah* or Islamic Senior High School (www.banyumaskab.go.id, 30/6/2012]. However, schools that have a serious interest in character education is still not much.

The choice of SMP (*Sekolah Menengah Pertama* or Junior High School) *Al-Irsyad al-Islamiyyah Purwokerto* in Banyumas district as the main object of study, since the Junior High School has special characteristics that is interested in the community. SMP *Al-Irsyad al-Islamiyyah Purwokerto*, in the beginning, was the Junior General Education system like an ordinary Junior High School in general came under the Department of Education and Culture. School performance is always at a lower level, both for the graduation rate (the value of the National Examination) and for achievement in a variety of other activities. Then since 2000, they transformed themselves into Islamic Junior High School model with full day education (i.e. education lessons from early morning hours until late afternoon).

Since becoming an Islamic Junior High School, the school began implementing Islamic culture with the values of Islamic culture such as the recitation of the Al-Qur'an (*tahfizh*) and the activities of prayer congregation. Thenceforth, the school got progress gradually. Three years later, in 2003, *Al-Irsyad al-Islamiyyah Purwokerto*, as Islamic Junior High School, is changing its name to Junior *Al-Irsyad al-Islamiyyah*. This school continues to grow until it can reach the best ranking in the district. By therefore need to be investigated, why the school is progressing rapidly, especially in academic achievement.

SMP *Al-Irsyad al-Islamiyyah* is a school that has declared itself as an Islamic culture-based schools. This statement is contained in the formulation of curriculum. The whole school activities conducted nuanced Islam. Character formation is a priority in academic

achievement. Therefore, spiritual activities like recitation of the Al-Qur'an, prayer congregation activities, and a major part of the activity pray daily activities, in addition to other activities that are part of the activities of Islamic culture.

Islamic culture is a culture that is colored shades (teaching) in his capacity as the Islamic *aqidah* and methods of life (Al-Sharqawi, 1986). According to A. Hasjmy (1993), Islamic culture is the embodiment of reason and sense of the Muslims, which means that the Islamic culture is rooted in Islam. Thus, the diversity of Islamic culture is very broad, covering activity of worship through social activities. Islamic cultural values that can be observed, among others, the implementation of the order of prayers, order of fasting, charity and social events, read and memorize the Al-Qur'an, prayer activities, peers help each other, forgive each other, shake hands, admit mistakes, honesty, and devotion to teachers and parents. The value of Islamic culture will be highlighted related to Mathematical thinking ability students only includes prayer, prayer activities, and memorization of the Al-Qur'an (*tahfizh*).

Prayer is like a generator that fills the soul every day. Prayer is the "fuel filler station" for the body. When a determination is reduced, decreased character, and lower body, prayer comes to supply with fuel Divine (Khaled, 2011). Therefore, one of the functions performed prayer five times a day and night is a force that can control your emotions, so that the brain is always fresh and capable of high reasoning. Similarly, prayer can be a means to train or discipline orderly life. People who used prayer time becomes a guarantee that they are disciplined or orderly. Therefore, the difference in seriousness and regularity in performing daily prayers is expected to provide the ability to think different, especially in reasoning abilities and regularity in solving Mathematical problems.

On the other hand, the implementation of an orderly prayer and filled with sincerity can control one to always remember (*dhikr*) of Allah SWT (*Subhanahu Wa-Ta'ala*). If the condition is always remember Allah be controlled, then the character being controlled to not commit adultery (Khaled, 2011). As

the word of Allah in the Al-Qur'an, verse Al-Ankabut, *ayat* 45 that "*Set up a prayer, real prayer can prevent indecency and evil*" (cited in Depag RI, 2007).

Praying is a need for every person who wants to be successful in any business. Praying is closely related to a belief that beyond the power of man no intrinsic power is the power of God. Wisdom prayer is for people to recognize its shortcomings and do not be arrogant. People who pray means have to trust and believe that God will grant it if we pray to Him (Khaled, 2011). As the word of Allah in the Al-Qur'an, verse Al-Mu'min, *ayat* 60 that "*Lord says: 'Pray to Me, surely you will be allowed. Indeed, those who boast of prayer to Me will enter Jahannam in abject circumstances'*" (cited in Depag RI, 2007). Therefore, the difference in seriousness and regularity in prayer are expected to give different confidence in solving problems, especially in Mathematical problems.

On the other hand, will develop the habit of praying noble spirit, which is growing recognition that people have no power except the power of Allah. Any success he achieved was with the permission of Allah, so that man should not be arrogant. Likewise, when a person experiences a failure, then he will not despair.

Memorize the Al-Qur'an requires a high concentration. The more that is memorized means higher concentration required. The process of memorizing is like a snowball rolling, the greater. This means that the letters that have been memorized will continue to be maintained, while adding a new letter. People who memorize the Al-Qur'an, it means doing



Picture 1:
Activities of Students Praying of *Dhuha* at the Mosque
(Source: Private Album, 20/5/2013)



Picture 2:
Activities of Students in Memorizing the Al-Qur'an at the Mosque
(Source: Private Album, 20/5/2013)

the repetition of words and the addition of new words. This will expand the capacity of the brain dynamics (Hulusi, 2006).

The same opinion was also expressed by Goleman that the neocortex (i.e. the uppermost layer of the brain that gives the ability to remember or think) would grow proportional to the size of the group that can be formed

(cited in Agustian, 2001). This means that the more rote collected the greater the neocortex, which also means the power of memory and thought getting stronger. Therefore, the difference in the number of suspected students have memorized will provide the ability to think different, both in the ability of reasoning, critical thinking, creative thinking, accuracy, and communication in solving Mathematical problems.

The activities of the Islamic cultural values positive effect on self-esteem, which form a noble spirit. Noble character is the embodiment of the practice of Islam (Khaled, 2010). Therefore, the reading activities and recitation of the Al-Qur'an is expected to encourage students to love the Al-Qur'an and Allah knows better. Likewise, the implementation of earnest prayer that is expected to prevent students from indecency and evil. Prayer activities undertaken with confidence are expected that students will be able to recognize any deficiencies so that he will be spared from feeling cocky. If the activities of the cultural values of Islam which is conditioned is done on a continuous basis and be customizing it will form a good character student. Good characters are expected to improve the effectiveness of students' Mathematical thinking ability.

Several previous studies on students' ability to think Mathematically, gave unsatisfactory results. The results E.E. Rohaeti (2008) at the Junior High School students said that the development of creative thinking ability with expository approach included in the category of less. That is not expository approach gives the maximum contribution in the development of creative thinking ability. Likewise, in E. Nurlaelah (2009) research on the prospective student teacher mentioned that learning by APOS (Action-Process-Object-Schema) theory to develop creativity even in the medium category.

Developing creativity is not maximum flexibility, particularly on components. In N. Ratnaningsih (2007) research said that the influence of contextual learning to increase creative thinking ability of Senior High School students is in the category of pretty. S.W.D. Pomalato (2005) research on the Junior High

School students with a model for developing creative abilities, Treffinger achieved only at low levels.

The results E. Suhena (2009) research at the Junior High School students mentioned that there was an effect REACT (Relating, Experiencing, Applying, Cooperating, and Transferring) strategy to increase Mathematical reasoning, but there was no interaction between initial ability students with learning strategies. The results E. Nurlaelah (2009) also states that learning by APOS theory to develop Mathematical power, but the reasoning component less than the maximum. Yurniwati (2009) research, mentioned that the computer-based problem solving (CBPS) are less apt to enhance mathematical reasoning abilities.

Several other studies have reported the results of studies related to memorization. Memorization is seen as a method rather than as an activity, so excellence rote activity is not revealed. As reported A. Khaled (2011) that rote memorization is done in schools include certain books like *Alfiyah* and memorizing the letters of the Al-Qur'an. Recitation is done by students in front of the religious scholars/preachers.

To this day, recitation method is retained in boarding schools, because they have advantages and disadvantages. However, the advantages of this method are not clearly disclosed. According Marfuah (2010), conventional methods such as rote is still used in modern Islamic boarding school *Al-Amanah*. Islamic boarding school is only combines modern curriculum and *salaf*, but does not integrate classical and modern teaching methods. But the method remains prevent rote without any apparent reason, although the boarding school is still optimistic that the rote method is still needed.

Several previous studies reported on the relationship with the character of learning achievement. But these efforts have not explained what is being done to the character formation. As reported by Mukhlisin (2004) that there is a correlation between students' social behavior of MTs (*Madrasah Tsanawiyah* or Islamic Junior High School) with learning achievement. In this study, social behavior is

Table 1:
Description of Students' Mathematical Thinking Ability

No	Capability	Achievement Categories		
		High	Medium	Low
1	Mathematical Reasoning	a. Master Mathematical concepts and principles. b. Involving deductive and inductive reasoning. c. Solving formally. d. When confirmed about the answer, they feel confident.	a. Master Mathematical concepts and principles. b. Dominant on deductive reasoning. c. Solving formally, but there are still students who are less conscientious. d. When confirmed about the answer, they soon discover his mistake and know the answer in question.	a. Less master Mathematical concepts and principles. b. Dominant on inductive reasoning, although less clear. c. Solving formally, but still inaccurate. d. When confirmed, they are always less certain of the answer itself.
2	Mathematical Creative Thinking	a. Able to elaborate answers. b. Originality answers. c. Fluency in providing forms possible. d. Flexibility at the level of both individuals and groups.	a. Able to elaborate answers. b. Originality answers. c. Fluency in providing forms that may. d. Flexibility at the individual level is quite good.	a. Originality of the answer, though sometimes wrong. b. Less able to elaborate on the answer. c. Smoothness is less visible. d. Flexibility is less visible.

related to morality; and learning achievement is only related to religious materials such as *aqidah*. It has not been studied on learning achievement in general.

According to A. Choliq (2011), there is a correlation between the achievements of Islamic education with elementary students' character. This strengthens the relevance of religion to moral knowledge, although the study did not explain the process of moral formation. According A. Jauhari (2011) with intensive coaching character in boarding school, one result is that the effectiveness of a high intellectual students.

With regard to the results of previous studies above, in this study, the researcher positioned rote as one activities Islamic culture, not as a method of learning. Similarly, students' ability to think Mathematically analyzed qualitatively descriptive, not quantitative. Activity assessed the impact of Islamic culture on the formation of character and at the same time influence in Mathematical thinking, including reasoning and creative thinking Mathematically.

FOCUS AND METHOD OF RESEARCH

Based on the background of problems, the focus in this study is "How description of

students' Mathematical creative thinking and reasoning ability in Islamic Culture-Based Learning?"

The method used in this study was qualitative method. Primary data in this study is qualitative data, to find a description of students' Mathematical thinking skills; and find the hypothetical statements related to the cultural values of Islam to the description of students' Mathematical thinking skills. The main research site chosen was the Junior High School *Al-Irsyad al-Islamiyyah Purwokerto* with eighth grade students and selected six students as respondents.

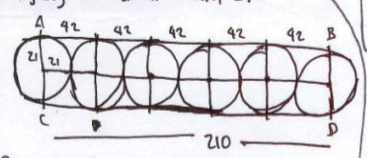
Data was collected by the test, observation, questionnaire, interview, and documentation. The data collected is then analyzed. Analysis of qualitative data through measures: domain analysis, analysis taxonomy, and componential analysis. The testing of the validity of qualitative data through: credibility test, dependability test, and conformability test.

RESULTS AND FINDINGS

The research was conducted in Junior High School *Al-Irsyad al-Islamiyyah Purwokerto*, eighth grade students, totaling 28 students and 6 students selected as respondents. Data were analyzed qualitatively and the results are

PEMECAHAN MASALAH

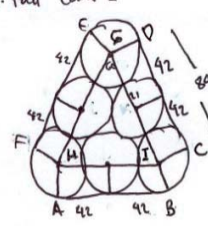
Panjang tali untuk cara 1.



Panjang tali = $AB + BD + DC + AC$
 $= 210 + \frac{1}{2}KO + 210 + \frac{1}{2}KO$
 $= 420 + KO$
 $= 420 + \pi d$
 $= 420 + \frac{22}{7} \cdot 42$
 $= 420 + 132$
 $= 552 \text{ cm}$

Jawaban lain

P. tali cara 2

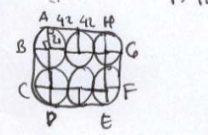


Panjang tali = $AB + BC + CD + DE + EF + AF$
 $= 84 + \frac{1}{3}KO + 84 + \frac{1}{3}KO + 84 + \frac{1}{3}KO$
 $= 252 + KO$
 $= 252 + \pi d$
 $= 252 + \frac{22}{7} \cdot 42$
 $= 252 + 132 = 384 \text{ cm}$

Panjang ED = $\frac{1}{3}KO$
 karena segitiga GHI sama sisi,
 maka $\angle HGI = 60^\circ$
 $\angle DGI = 90^\circ$ maka $\angle EGH = 90^\circ$
 maka $\angle EGD = 360^\circ - (60^\circ + 90^\circ + 90^\circ)$
 $= 360^\circ - 240^\circ$
 $= 120^\circ (\frac{1}{3}KO)$

MEMERIKSA KEMBALI (apakah ada jawaban lain?, apakah ada cara lain?)

Cara 3



P. tali = $AB + BC + CD + DE + EF + FG + GH + AH$
 $= \frac{1}{4}KO + 42 + \frac{1}{4}KO + 84 + \frac{1}{4}KO + 42 + \frac{1}{4}KO + 84$
 $= 42 + 42 + 84 + 84 + KO$
 $= 252 + \frac{22}{7} \cdot 42$
 $= 252 + 132 = 384 \text{ cm}$

Jadi, untuk posisi/cara 1, panjang tali minimal adl 552 cm. ; untuk posisi/cara 3, panjang tali minimal 384 cm.
 dan diantara posisi 1 & 2, panjang tali yg terpendek adl posisi 2 yg adl 384 cm.

reported as follows:

One example of students' work is as follows. The problem: six tubes of zamzam each its height is 1.2 m with a radius of lid is 21 cm, fastened transversely to be sent to the settlement of pilgrims. Calculate the minimum length required of rope to tie the six tubes.

About linkage the ability to think Mathematically with Islamic cultural activities, it can be described as follows: (1) For students, who have *tahfizh* relatively large, there is a tendency delighted at the challenge questions. There is the courage to try another way, so that it can be said they have the critical thinking ability, creative thinking, and good problem solving; (2) For students whose discipline in prayer, there is a tendency of them in order to solve problems, which is coherent and carefully, so that it can be said they have the skills in critical thinking and good reasoning; and (3) For students who are serious and diligent in prayer, there is a tendency they have

strong beliefs. They are not easily swayed by the results they get, and I would say they have a good belief in any sort things out.

Based on these results, conjectures can also be formulated as follows: (1) Activity values of Islamic culture positive effect on student achievement, particularly in Mathematics; (2) There is a relationship between students' character and academic achievement, especially in Mathematics; (3) Students who have memorized or *tahfizh* Al-Qur'an that relatively many, if learning Mathematics well it will likely have good Mathematical thinking skills, especially in problem solving and creative thinking; (4) Students who used to do the prayer properly and orderly, if learning Mathematics well it is expected to have a good Mathematical thinking skills as well as discipline in solving problems mathematically; (5) Students who used to do activities with both prayer and earnest, if learning Mathematics, it can be expected to have

Description of the level of activity of the student Islamic culture. The data presented, in the tabel 2 (two), is as follows:

Table 2:
The Islamic Cultural Activity Based Learning Achievement Category

No	Islamic Culture Activities	Learning Achievement Category		
		High	Medium	Low
1	Memorization/ <i>tahfizh</i>	a. Average memorized 673 verses. b. Graduated <i>juz</i> 30.	a. Average memorized 572 verses. b. Some students have finished <i>juz</i> 30.	a. Average memorized 433 verses. b. not yet finished <i>juz</i> 30.
2.	Taking a pray	a. They are required to pray five times a day. b. They are aware of their obligation to pray. c. They already feel the need to be serious in prayer.	a. They are required to pray five times a day. b. They pray because of a necessity both at school and at home. c. Their consciousness to pray is still lacking.	a. They are required to pray 5 times a day. b. They pray, despite the encouragement of others. c. Their consciousness to pray very low.
3.	Praying	a. They've done prayed regularly especially after the obligatory prayers. b. They've felt the need to pray to God for all his efforts to be successful. c. Prayer has become a necessity.	a. They've been praying especially after the obligatory prayers. b. They admit not pray regularly. c. They are praying that important, but often forgotten.	a. They rarely pray, including prayer after prayer. b. They forget to pray more. c. Pray do not be requirements.

confidence is good at solving Mathematical problems; (6) Good characters make room broader thinking skills. If accompanied by learning Mathematics better then expected to raise Mathematics achievement is excellent; and (7) School culture based on Islam, there is a tendency of students to not engage in activities that are not obvious benefits.

CONCLUSION

Description of junior high school students the ability to think Mathematically in terms of Islamic culture-based learning category of the achievement of high, medium, and low are as follows:

Mathematical reasoning students of high academic achievement category includes both deductive and inductive reasoning. The ability to use both types of reasoning can be said to be good, it can adapt to the needs in solving problems. These capabilities are supported by an understanding of Mathematical concepts and procedures are relatively high.

Achievement category was included as deductive and inductive reasoning.

But they are more dominant in using the deductive reasoning. Their reasoning ability is supported by an understanding of Mathematical concepts and procedures are pretty good. The low learning achievement category includes deductive and inductive reasoning. But they are more dominant in inductive reasoning. Their reasoning ability can be said is not good, because the understanding of Mathematical concepts and procedures are still relatively low.

Mathematical problem solving of students of high academic achievement category can be said to be complete and clear and can use appropriate problem-solving strategies. Problem solving ability seems supported by the ability to think creatively and think critically. It can be said that the ability of solving the problem quite well. Category achievement was pretty clear the problem-solving skills and be able to use appropriate problem-solving

strategies. However, they are often less careful in the calculation.

In solving the problem in general, they are not checking back (looking back) carefully. Therefore, the problem-solving ability can be quite good. Category of low academic achievement, less obvious in problem solving, and the use of problem-solving strategies are less directional, it can even be said they are less able to solve problems. They are generally less careful and immediate desire to solve the problem without identifying the problem and checking back (looking back). Solving the problem can be said to be less good.

Students' ability to think Mathematically in terms of the cultural values of Islam are as follows:

In general, the categories of high, medium, and low in achievement associated with the level of achievement of Islamic cultural values of students. The level of achievement of Islamic cultural values is also related to the level of character achievement of students. This means that the level of achievement associated with the level of character achievement of students.

Students who have memorized the Al-Qur'an relative plenty, we can say that they have a good fighting spirit to solve the problem despite having difficulty or impasse. Similarly, in terms of creative thinking, they have an edge in flexibility that had the audacity to try to solve the problem another way.

Students who discipline in prayer and serious in prayer, can be said to have good reasoning, especially reasoning deductively. The level of accuracy in a matter can also be said to be doing well.

Students who diligently pray and believe in prayer, can be said to have a strong belief, that having confidence (self-confidence) is good. Usually they do not waver with the answers given.

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