

Contributions Emotional Intelligence on Cognitive Learning Result of Biology of Senior High School Students in Medan, Indonesia

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ABSTRACT

Emotional intelligence is one of the factors affecting the success of students' learning results. Students having high emotional intelligence will be able to overcome the problems faced in school and in society. This research aims at investigating the correlation between emotional intelligence (EQ) and students' cognitive learning results of Biology and comparing the contribution of each indicator of EQ on the Biology cognitive learning results. This research was a correlational research. The samples in this research were 232 students of class X selected randomly from 7 schools. The results of this research show that there is a correlation between EQ and Biology cognitive learning results. EQ has a contribution on the learning results as much as 5.2%. The contribution of EQ indicator such as identifying self emotion was 0.01%, managing emotions was 0.05%, motivating oneself was 0.60%, recognizing emotions in others was 0.33%, keeping relationship was 4.25%. The information related to the correlation between EQ and biology learning results, as well as the contributions of each indicator related can be advantageous information for teachers to develop the students' EQ through the implementation of appropriate information learning strategies.

KEYWORDS

Cognitive learning results, emotional intelligence, EQ indicator, senior high school

ARTICLE HISTORY

Received 27 August 2016
Revised 19 September 2016
Accepted 19 September 2016

Introduction

The complexity of students' characteristics is determined by aspects or qualities of students' individual consisting of their interests, attitudes, learning motivation, learning styles, thinking skills and initial ability (Hamzah, 2006). Those things indirectly help to build students' morale and confidence, both physically and psychologically. Students'

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psychological characteristics cannot be separated from their personalities. According to Santrock (2009) personality refers to thoughts, emotions, and behaviors showing how individuals adapt to the world. Senior high school students who are in their adolescence period are in transition from childhood to adulthood, in which it is characterized by emotional instability. Hurlock (1997) stated that most adolescents experienced emotional instability from time to time as the consequence and efforts to adapt to new patterns of behavior and new social expectations. Adaptation to new things can cause stress. Stress can be observed from the reaction of the body, both neurologically and physiologically, to adapt to new conditions (Franken, 1994).

The research of Gall et al. (2000) showed that students who just entered senior high school often experienced stress. This phenomenon is occurred because students are experiencing a change in the education system, lifestyle, and social environments. Their learning results are determined by their performance in the classroom, assignments, presentations, exams and evaluations in each semester (Ong et al., 2009). Students must be able to manage their time and activities. Each individual has a different level of stress and its causes. One of the causes of stress in students is the huge amount of the subject matter (Sirin, 2007). The other factors causing stress in students are academic failure, sports, finance, health, loss of family members and friends (Elias, 2011). Substantive issues faced by students in education is known as academic stress. The research of Elliot et al. (2005) and Choi, et al. (2007) reported that stress affected students' academic achievement.

The results of the observations conducted in senior high school, Medan, Indonesia showed that students experiencing academic stress appeared to be lazy in following the lessons, lack the confidence to perform in front of the class, and felt embarrassed to express ideas during the learning activities. In addition, students often clashed with the other friends because they had different opinions. This showed that the students had not been able to exploit the emotions productively. Another fact was that students often were alone in the classroom, skipped their classes, or arrived late due to academic stress. Students complained that they felt the academic stress when they had exams, class competitions, and too much study to obtain a good learning results (Carveth, Jess & Moss, 1996). Bennett (2003) has reported that stress was significantly correlated with students' poor academic performance. Everyone uses a variety of ways to overcome stress, including by using their intelligence, especially their emotional intelligence (EQ) (Sirin, 2007).

Individuals who have a high emotional intelligence will be able to process and understand their emotions, allowing them to adapt and to be tolerant to their environment when they are experiencing stress (Bar-On, 1997; Goleman, 2005; Matthews et al., 2006). With the ability to understand and control emotions, they will be more capable to express their feelings. This condition will help students to communicate more effectively both in schools and in society. Students who communicate effectively can receive learning materials well. It is assumed that emotional intelligence can be directed to improve the social adaptation (Matthews, Zeidner, & Roberts, 2002).

Emotional intelligence is related to social relationships. Hatfield et al. (1994) stated that the ability to manage emotions could help students socialize. Furthermore, Keltner and Haidt (2001) suggested that emotional intelligence had a contribution to the quality of social relations in society and workplace. Emotional intelligence can help students select the good action in social activities.

Emotional intelligence is a predictor of students' academic success, in that students who have high emotional intelligence will work better in their groups. According to Salovey and Mayer (2009) EQ includes self-knowledge, self-control, motivation, empathy and social skills. Low and Nelson (2002) stated that EQ played an important role in students' learning success. The research conducted by Marquez et al. (2006) on senior high school students showed that EQ had a correlation with students' academic achievement. The other researches also reported that there was a correlation between emotional intelligence and the learning results of senior high school students (Parker, Summerfeldt et al., 2004). Similarly, Swart (1996), Bar-On (2003), Parker et al., (2004) asserted that EQ could be used to predict students' academic success.

Several previous researches have reported that there was a correlation between EQ and students' academic success. Those researches have designed, tested, and implemented the construction of EQ with learning results. Singh et al (2009) used the *Schutte Self Report Emotional Inventory Test* (SSEIT) to measure students' emotional intelligence, and the results showed that emotional intelligence had a significant correlation with learning results. A different research finding was found by Johnson (2008) who adopted the emotional intelligence tests developed by Gregorc and Mayer Salovey-Caruso *Mayer-Salovey-Caruso Emotional Inventory Test* (MSCEIT), and it showed that there was not any correlation between emotional intelligence and learning results. Snowden et al. (2015) used the *Trait Emotional Intelligence Questionnaire* (TEIQue-SF), and Schutte et al., (1998) used the *Emotional Intelligence Scale* (SEIS) related to the correlation analysis between emotional intelligence and learning results. The results showed that there was not any correlation between emotional intelligence and learning results.

This research aimed at investigating the correlation between EQ and students' biology cognitive learning results and comparing the contribution of each EQ indicator on the Biology cognitive learning results. The findings of the correlation between EQ and students' Biology cognitive learning results and the contribution of each EQ indicator on Biology cognitive learning results can be valuable information for teachers to develop students' emotional intelligence through the implementation of appropriate learning strategies.

Method

Respondents

The population used in this research was all state senior high school students in Medan, Indonesia, with a number of 22 schools. The sample in this research was 232 tenth grade students who were randomly selected from each school.

Materials and Procedures

This research used survey method with quantitative correlational approach or *ex post facto*. This research aims at investigating the correlation between EQ variable as the predictor and the students' cognitive learning results as the criterion.

The test for the emotional intelligence was *the Emotional Quotient Inventory* (EQ-i) (Bar On, 2006) consisting of five indicator. Those five indicators were 1) recognizing self-emotions (recognize and understand our own emotions, understanding the causes of the emotions), 2) recognizing emotions of others (sensitive to the feelings of others, listen to other people's problems), 3) self-motivation (optimistic, encouragement of

achievement), 4) The relationship (able to cooperate and communicate), and 5) managing emotions (controlling emotions, expressing emotions appropriately).

The emotional intelligence test consisted of 60 statement items and used a 4-point Likert scale. The responses to each statement of a four scale that was favorable were 4 (strongly agree), 3 (agree), 2 (disagree), and 1 (strongly disagree); and unfavorable 1 (strongly agree), 2 (agree), 3 (disagree), 4 (strongly disagree). The higher the emotional intelligence scale score was obtained, the higher the emotional intelligence. Conversely, the lower the scale score was obtained, the lower the emotional intelligence.

The data of the students' cognitive learning results were obtained from a multiple choice test consisting of 50 questions developed by the researcher in accordance with the levels of Bloom's Taxonomy that has been revised by Anderson & Karthwohl (2001). Before the test instruments of students' cognitive learning results were used, they were validated by experts and empirical testing. Expert validation included content validity and construct validity. While the empirical testing was done by trying out the questions in class XI of senior high school students. The try out was conducted to determine the validity and reliability of the test items, discriminating power and levels of difficulty.

The data analysis used regression analysis to determine the regression equation of the correlation between EQ and students' biology cognitive learning results. In addition, this research also revealed the contribution of each EQ indicator to the Biology cognitive learning results. The data analysis used SPSS 17 for windows.

Results

The results of the regression analysis of the correlation between EQ indicator and Biology cognitive learning results can be seen in Table 1 until Table 4. Table 1 shows that the F value was 2.498 with a significance value of the correlation between EQ and students' Biology cognitive achievement of 0.032. The data in Table 2 show that the constant value was 59.741. Thus, the regression equation was $y = 59,741 - 0,001X1 - 0,009X2 + 0,107X3 - 0,80X4 + 0,191X5$.

Table 1. The results of the anova of the correlation between EQ and Biology Cognitive Learning results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	347.472	5	69.494	2,498	,032(a)
	residual	6288.045	226	27.823		
	Total	6635.517	231			

Table 2. The results of Regression Coefficients of the correlation between EQ Indicators and Biology cognitive Learning results

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	Collinearity Statistics

	B	Std. Error	beta	Toletance	VIF		
1 (Constant)							
Recognizing self-emotion	59.741	7.990	7.477	,000			
Managing emotions	-,001	,071	-,001	-,012	,991	,754	1,327
Self-motivation	-,009	,076	-,009	-,123	,902	,741	1,349
Recognizing emotions in others	,107	,065	,122	1,640	,102	,759	1,318
relationships	-,80	,067	-,096	-,1200	,232	,653	1,532
	,191	,060	,274	3.191	.002	,568	1,760

a. Dependent Variable: Biology learning results

Table 3 shows that the value of R square is 0.052. It means that the total contribution of the EQ indicator on students' cognitive learning results is 5.2%. Therefore, in addition to EQ, there are other factors that have an effect on students' Biology cognitive learning results as much as 94.8%. Table 4 shows that the parameters of each EQ indicator, namely: Recognizing self-emotion has effective contribution of 0.01%, Managing emotions has effective contributions of 0.05%, Recognizing emotions in others has effective contribution of 0.33%, Self-motivation has effective contributions of 0.60%, and relationship has effective contribution of 4.25% to Biology cognitive learning results. It appears that the relationship is an indicator of EQ that has the greatest contribution to Biology cognitive learning results of all the EQ indicators.

Table 3. The Correlation between EQ Indicators and Biology cognitive Learning Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,229 (a)	,052	,031	5.27477	1,942

Table 4. The Contributions of EQ indicators and Biology cognitive learning results

Variable	RC (%)	EC (%)
Recognizing self-emotion	0.11	0.01
Managing emotions	0.99	0.05
Self-motivation	11.49	0.60
Recognizing emotions in others	6.27	0.33
Relationships	81.15	4.25
Total	100.00	5.24

Discussion

The results of the data analysis show that there is a correlation between EQ and Biology cognitive learning results. The contribution of EQ to Biology cognitive learning results was 5.2%, and 94.8% is the contribution of other factors. Goleman (1995) in his book stated that EQ contributed 20% of a person's academic success and 80% was the contribution of other factors to a person's success of academic learning results. The level of EQ contribution to the cognitive learning results in some previous researches varies. The results of the research conducted by Kasih (2009) showed that EQ had a contribution of 64% to the learning results, while Husnah (2009) reported that the contribution of EQ to learning results was 21.60%. The results of the research by Zanjani (2015) reported that 80% of one's life success depended on the EQ, and only 20% depends on IQ. The results of the research by Parker et al. (2004) reported that the indicators of emotional intelligence had a significant correlation with the learning results.

This research result is also in line with the research results conducted by Nelson et al. (2002), Parker (2004), and Singh et al. (2009) stating that EQ had a positive correlation with learning results. Children who having a high EQ will be more able to concentrate, solve problems, and improve their cognitive learning results (Soltanifar, 2007). Several different research results were reported by Brackett (2004), Elias et al. (2003), Samari and Tahmasebi (2007), Besharat et al. (2006). These researches report that there was not any positive correlation between EQ and learning results.

The results of research are in line with the results of Fallahzadeh (2011) who found that the indicators of emotional intelligence did not have significant correlation with learning results. The low correlation between EQ and learning results in this research was presumably caused by the use of EQ questionnaires which was not quite accurate. To date, the measurement of emotional intelligence has been done by using a questionnaire (Tapia, 2001). On the other hand, Akinboye (2004) and Ongundokun (2010), measuring emotional intelligence using *Behavior Emotional Quotient Inventory (EQBI)* stated that emotional intelligence had a significant correlation and contribution to learning results.

Questionnaire is an instrument commonly used in educational and psychological research, but there is a bias response from the use of this questionnaire. Paulhus (1991) stated that bias response was a systematic trend in responding to the questionnaire items on some fundamentals of a specific item content. Bias response provides answers which are considered appropriate to social expectations. It is the tendency to make the respondents look good. Hasan (2014) found that when the students filled out a questionnaire, the students expressed what became the expected answers, not based on the reality.

The inaccuracy of the use of questionnaires for the population in Indonesia has been reported by Bahri (2010) in relation to the measurement of metacognitive awareness, and also by Bahri and Corebima (2015) in relation to measure students' learning motivation. Therefore, the measurement of emotional intelligence using questionnaires need to be developed better and adapted to students' cultural characteristics. In addition, the other measuring instruments to confirm or to check the measurement results of the questionnaire need to be considered.

EQ refers to emotional information related to the perception, assimilation, expression, regulation and management (Mayer and Cobb, 2000; Mayer, Salovey and Caruso, 2006). Student learning activities are related to how students can manage the tasks given. Related to the other emotional information (managing emotions, recognizing

emotions, and recognizing the emotions in others), this research reported that these indicators have small contribution to biology learning results. Students who can manage their emotions well will be able to overcome the situation in the exam, avoid anxiety during exams, deadlines, competition, and focus on learning. Emotion-management can lead students to overcome critical situations and an abundance of tasks. Similarly, Nelson et al. (2002) found that students who could manage their emotions could manage the lesson well. Fallahzadeh (2011) also reported that the aspect of emotional intelligence, emotion management, could have an effect on the success of the students' performance in the learning results.

This research found that self-motivation also had a contribution to cognitive learning results. Motivation is an internal process (within someone) that activates, guides, and maintains behavior within a certain time. Motivation can encourage people to do something (Hurlock, 1996), including the motivation to learn. Santrock (2007) and Brophy (2004) stated that the motivation to learn more emphasized on cognitive responses, i.e the tendency of students to achieve academic activities which were meaningful and beneficial, and try to get the benefits of such activities. Students having the motivation to learn will pay more attention on the learning lessons, read and understand the material, and use specific learning strategies. Moreover, the students are also involved in the learning activity, have high curiosity, search for materials related to the topic, and accomplish a given task.

This research also revealed that the indicator of EQ that had the most contribution is the relationship as much as 4.25%. The research conducted by Jaeger and Eagan (2007) found that relationship indicator played a significant role in predicting the learning success. Students who can keep relationships and build social relationships in schools will have good emotional intelligence which further contributes to the learning results (Seibert, Kraimer & Liden, 2001). Further, students who can build relationships (cooperation, and communication) can present what is gained in the learning process. It has been proven that not only does it contribute to academic success, relationships can also make the students able to work well within a team, work without pressure, and contribute to the group. Students who have a high learning results will dominate the decision-making in the group (Gokhale, 1995).

The findings of some previous studies state that the student can manage emotional intelligence can work with friends and group (Law, Song, & Wong, 2004; Van Rooy & Viswesvaran, 2004). The teachers can facilitate students' interaction and group work in the learning process to develop EQ. Furthermore, when the EQ develop, the students' learning results will also develop. One of learning models that can accommodate it is cooperative learning model. This strategy is based on constructivist learning theory (Vygotsky, 1978) which emphasizes the social interaction as a mechanism to support the cognitive development. In addition, this model is also supported by the information processing theory and cognitive theory of learning. The implementation of this model helps students to process information more easily (encoding). The encoding process will be supported by the interactions that occur in Cooperative Learning. Cooperative Learning method is based on Cognitive theory because, according to this theory, interaction can support the learning. The learning motivation of the students having high learning results tends to increase. The exchange of ideas will actively occur in groups. Patton (2011) stated that students having a high EQ would have a good relationship with others.

Conclusion

It is concluded that EQ has a low correlation with the cognitive learning as much as 5.24%. The low correlation of EQ in this research was caused in part by use of ineffective inventory. To keep a good relationship is the biggest indicator of the EQ to the Biology cognitive learning compared with the other EQ indicators.

Based on the results of this research, it is suggested that teachers develop students EQ in schools based on the EQ indicators. The parents and the society are suggested to pay more attention to the development of their children, because if the child is only given abundant material without adequate attention from parents, all will be less useful for the development of the child. To prevent the influence of culture or bias response in the use of EQ inventory, it is necessary to develop the other measurement tools which are integrated in test such as achievement test.

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