Relationship between Learning Environment and Academic Achievement in Academically Gifted Students

Jamaliah Ijak, Saemah Rahman, and Hamzan Omar

Abstract -- Previous research stated that one of the risk factor that can interfere with the development of academically gifted students is learning environment factor. This study aims to identify the relationship between the learning environment and academic achievement and identify the perceptions on learning environment between three groups of academically gifted students. The learning environment was studied using Bransford theoretical framework of learning environment which consists of four components, namely student-centered environment, knowledge centered environment, assessment-centered environment and community-centered environment. 453 academically gifted students from 18 secondary schools. Correlation and MANOVA analysis were used to answer the research questions. Correlation analysis showed a significant relationship between learning environment and academic achievement among academically gifted students. MANOVA analysis found significant different in perceptions towards learning environment between the three groups of academically gifted students. Testing of the subject using a new significant level after Bonferroni adjustment showed significant differences in the perception of student-centered environment component. This study supports the need to provide a learning environment that takes into account all the components in a holistic approach to academically gifted students to avoid the phenomenon of gifted underachievers.

Keywords -- Learning environment, Academically gifted student, Gifted underachievers, Academic achievement

I. INTRODUCTION

Academically gifted students can be defined as a group of students who are in the top 10% of students in the same age (Gagne, 2003; 2005). Achievements in school is an important predictor for determining the level of achievement in higher education (Huurre, Aro, Rahkonen, & Komulainen, 2006) especially relating to a future career (Suldo, Shaffe & Shaunessy, 2008). In this case, the education sector is considered as one of the sectors that are responsible to educate individuals so that they can contribute to the country in their expertise area (Rosadah, 2004; Renzulli, 2003). Gifted and talented students is an asset to the country's success in the to enable them to be developed and giving benefit to the

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future (McCoach & Siegle, 2002; Kirk, Gallagher, & Anastasiow 2003) and they should be given special attention community (Colangelo & Davis (2003). ; Robinson, 2002). Looking at the value of education and development of gifted and talented student in this country, it can be said that the failure of gifted and talented students can lead the country suffered losses due to the neglected of worthy natural resources (Rosadah, 2004; McCoach & Siegle 2002). When an academically gifted student fails to achieve the expected level of academic potential, it will cause frustration among parents, teachers and counselors Gallagher, 2011) and even more it is a tragedy that brought huge losses to the country (Gallagher, 2003); (Hoover-Schultz; 2005).

II. GIFTEDNESS AND LEARNING ENVIRONMENT

Differentiated Model of Giftedness by Professor Francoys' Gagne (Gagne, 2003; 2005) is a talent development model that combines the elements necessary to produce talented. Figure 1 shows how the development of a natural talent (G) owned by individuals turned into talent (T) the existence of an element of the development process (D) associated with environmental catalysts (E) and intrapersonal catalysts (I) and chance (C). According to Gagne, (2003, 2005) environmental and intrapersonal catalysts can have a positive and negative impact on the development of gifted into talented. If the positively impact the development process it will turn gifted into talented. On the other hand when there is a negative impact the underachievers' situation will be occur.
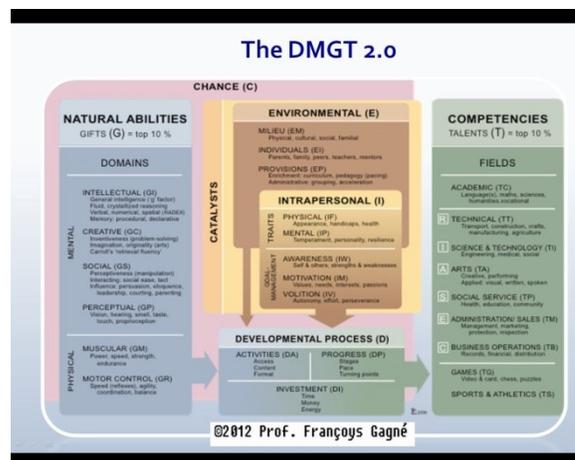

Fig. 1. Differentiated Model of Gifted and Talented (DMGT)

The importance of the environment as a catalyst in the DMGT 2.0 shows there is a need to provide a positive learning environment that can have a positive impact on the learning outcomes such as academic achievement and motivation (Doppelt & Schunn, 2008). This is due to students can learn better when they have a positive perception of their learning environment (Abell & Taylor, 2011). The learning environment is provided to assist students to determine learning goals which in turn can lead to high achievement.

Bransford, Pellegrino, & Donovan (1999) and Bransford, Brown & Cocking, 2000) has suggested four elements that must be given attention in designing learning environment in schools to enhance student's ability to be active learners who seek to understand the complex issues while willing to apply the knowledge in a variety of situations. Figure 2 shows the four elements suggested that learner-centered environment, knowledge centered environment, assessment-centered environment and community-centered environment.
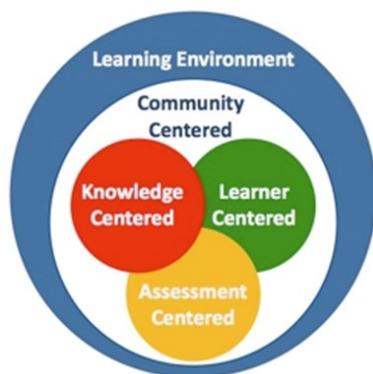
Fig. 2. Learning Environment Model - How People Learn
(Bransford, 1999, 2000)

Learner-centered environment refers to the idea that students come to school with the skills, knowledge, attitudes and their own beliefs. Therefore the teacher must feel sensitive with the cultural practices of students and respect local languages used by students and accept the student as a unique individual and respect for individual differences. Teachers should be aware that students will construct meaning from what they have learned based on trust and understanding in their own culture or background.

Knowledge-centered environment emphasizing to produce student who are knowledgeable through learning, brings understanding and led to the transfer of knowledge that can be meaningful. Focus of knowledge-centered environment not only to problem solving knowledge, thinking skills and knowledge transfer (Jonassen & Land 2000) but also to organize knowledge and problems with structured processes and give meaning to the knowledge (Bransford et.al. 1999; 2000; Jonassen & Land, 2000).

Assessment-centered environment should provide opportunities for students to get feedback and revise what they have learned in addition to the assessment should be consistent with the learning goals to be achieved. Assessment is not only to measure the performance even the assessment can be used to improve understanding of the learning process.

Community-centered environment is the support component that involves learning not only through subject teaching but also through norms learned from each other. Norms and practices that are different in the classroom affects what is taught and what is assessed in the process of teaching and learning. Teachers who give space for students to make mistakes in class will help students find understanding and learn from mistakes. How the teachers communicate with his or her students in the classroom can convey the message of positive or negative expectations of teachers to students.

III.   METHOD

This study aims to i) identify the relationship between the learning environment and academic achievement among the academically gifted students and ii) identify the perceptions on learning environment between three groups of academically gifted students. Hence, quantitative survey by questionnaire form was conducted to collect the data. The sample for this study comprised 453 form four students from 18 public schools in Malaysia (222 male, 231 female). All of the samples were achieved 6As to 10As during their Form 3 public examination (Penilaian Menengah Rendah). The samples were selected randomly from each school base on their group of performance.

Instruments

For the purpose of this study, a questionnaire containing 31 items to assess student's perception on learning environment was used. The questionnaire was developed by the researcher. It includes four components in learning environment model by Bransford et.al (1999; 2000) which are i) learner centered environment – 11 items, knowledge centered environment – 8 items, assessment centered environment – 4 items, community centered environment (peers) – 4 items and community centered environment (administration) – 4 items. The questionnaire used 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. Student's achievement were assessed by the average result from three standardized test. Student's achievement were divided into three group which are top 20% (high achievers), bottom 23% (underachievers) and the in between (moderate). The reliability of the questionnaire using Cronbach Alpha showed high reliability for overall learning environment construct (0.927) and high reliability or each component, learner centered (0.867), knowledge centered (0.811), assessment centered (0.672), community centered-peer (0.852) and community centered-administration (0.850).

IV.   RESULTS

To answer the first question of the study, a Pearson product-moment correlation was used to find out the relationship between learning environment and achievement. Regarding the second question, the Multivariate analysis of

variance (MANOVA) were performed to identify the differences of perception among the three groups of academically gifted students.

Research Question 1: Relationship between learning environment and achievement

In order to find out the relationship between learning environment and achievement, Pearson product-moment correlation analysis was run. Cohen (1988) in Pallant (2011) suggested the following guidelines to interpret the strength of the Pearson correlation with (r) value; r=0.10 to 0.29 (small); r=0.30 to 0.49 (medium) and r=0.50 to 1.0 (large). The negative and positive sign refer only to the direction of relationship, not the strength.

The results revealed a significant relationship between overall learning environment and achievement (r=0.139, p<0.01). The results also indicated a significant relationship between learner centered and achievement (r=0.126, P<0.01), knowledge centered and achievement (r=0.114, p<0.01) and assessment centered and achievement (r=0.131, p<0.01). Nevertheless, no significant relationship indicated between community centered and achievement. The directions of relationship were positive. Results showed as Table I.

TABLE I: THE RELATIONSHIP BETWEEN LEARNING ENVIRONMENT AND ACHIEVEMENT

Components	LC	KC	AC	CC-p	CC-a	Overall LE
Achievement	0.126 **	0.114 **	0.131 **	0.090	0.079	0.139 **
Pearson-correlation						
Sig (2-tailed)	0.007	0.015	0.005	0.056	0.092	0.003
N	453	453	453	453	453	453

** Correlation is significant at the 0.01 level (2-tailed)

Research Question 2: Academically gifted students perception on learning environment

Multivariate analysis of variance (MANOVA) was used to determine whether there was a significant difference in perception towards learning environment between high achievers, moderate achievers and underachievers. The findings of the research are shown in tables below. Table II showed the high achievers students' perception on learning environment is found to be higher than moderate achiever and underachievers groups. It is determined that the high achievers highest perception on learning environment is assessment learner centered (M=4.18) and the lowest is community centered –admin (M=3.52). Both moderate achievers and underachievers groups showed the highest perception on community centered – peer (M=4.13 and M=4.00) and the lowest perceptions on community centered-admin (M=3.46 and M=3.39).

TABLE II: DESCRIPTIVE ANALYSIS

Components	Group	Mean	SD	N
Learner centered	High achievers (HA)	3.89	0.62	103
	Moderate achievers (MA)	3.66	0.59	241
	Underachievers (UA)	3.69	0.57	109
Knowledge centered	HA	4.07	0.51	103
	MA	3.90	0.59	241
	UA	3.89	0.51	109
Assessment centered	HA	**4.18**	0.62	103
	MA	4.04	0.57	241
	UA	3.98	0.59	109
Community centered-p	HA	4.14	0.73	103
	MA	**4.13**	0.68	241
	UA	**4.00**	0.76	109
Community centered-a	HA	**3.52**	0.89	103
	MA	**3.46**	0.94	241
	UA	**3.39**	0.93	109

As seen in Table III, it is tested by the multivariate analysis of variance whether the difference perception on learning environment between the three groups is statistically significant or not and the averages are found to be significantly different (Wilk's Lambda =0.959; F=1.903, p<0.05)

TABLE III: HIGH ACHIEVERS, MODERATE AND UNDERACHIEVERS PERCEPTION ON LEARNING ENVIRONMENT – MULTIVARIATE ANALYSIS
(Box's M=50.959; F=1.67, p>0.01)

	Multivariate F Df=10	Error df	p	*Partial eta square*
Pillai's Trace	1.901	894	0.042	0.021
Wilks' Lambda	1.903	892	0.041	0.021
Hotelling's Trace	1.905	890	0.041	0.021
Roy's Largest	2.995	447	0.011	0.032

Table IV show a significant difference between high achievers, moderate and underachievers in LC (F=5.39, p<0.05); KC (F=3.59, p<0.05) and AC (F=3.22, p<0.05). Whereas, there are no significant difference between CC-p (F=0.145, p>0.05) and CC-a (F=0.50, p>0.05). Nevertheless, Bonferroni Adjustment was considered to decrease the *Type I Error* and new significant level indicated as 0.01 (0.05÷5). Therefore, significant difference is only in LC F(2,450)=5.39, p<0.01). Post hoc analysis (Tukey HSD) was run to identify which groups are different. Tukey HSD analysis showed significant difference (p<0.05) between moderate achievers (mean=3.66, *sd*=0.59) and high achievers (mean=3.89, *sd*.=0.57)

TABLE IV: TEST OF BETWEEN SUBJECTS EFFECTS ON LEARNING ENVIRONMENT COMPONENTS

Learning environment components	Multivariate F Df = 2	*p*	*Partial eta squared*
Learner centered environment (LC)	5.39	0.005	0.023
Knowledge centered environment (KC)	3.59	0.028	0.016
Assessment centered environment (AC)	3.22	0.041	0.014
Community centered – peer environment (CC-p)	1.45	0.236	0.006
Community centered – admin environment (CC-a)	0.50	0.606	0.002

V. DISCUSSION AND CONCLUSION

As the findings of this study, learning environment components has positive relationship with achievement. Even though the relationship are relatively small but it showed that better learning environment is related to the better achievement. Hence, positive and conducive learning environment is important to enhance the development of students' natural abilities. According to Gagne (2003, 2005) the development of a natural talent which owned by an individual will turn into talent with the existence of an element in the development process which associated with environmental catalysts, intrapersonal and chance.

As stated by previous researches a positive learning environment catalyst is a need to provide a positive impact on the learning outcomes and students can also learn better when they have a positive perception on learning environment. (Abell & Taylor, 2011). Study shows there is significant difference in perception on learner centered environment between moderate achievers and high achievers. The finding indicated that the moderate group has the tendency to be underachievers because it has no significant difference between two of them. In practical, teachers should feel sensitive with the students' background. Put in effort to accept and respect the students as an individual. In addition to teaching, the task in education is to develop the potential and ability of the students. Although there were no significant different in three other components of learning environment, it can be suggested that gifted learners have the same perception on them. Therefore to ensure that teachers do not only focus on the background of the students, then the three other components of learning environment should also be given attention. The learning process should take place either students build knowledge from their existing knowledge or learn to use certain strategies that are guided by the teacher. The feedback from the exercise or the result of the test given can help to correct the misunderstanding or misconception of knowledge at the early stage. Continuous feedback can make it easier for students to remember the lessons. The role of community in school as support systems will strengthen the learning process. Administrators who are concerned about the students' welfare and performance will encourage students to have the feeling a sense of belonging.

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