THE DIRECT AND INDIRECT EFFECTS OF ENVIRONMENTAL FACTORS ON NURTURING INTELLECTUAL GIFTEDNESS

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Many people believe that environmental factors promote giftedness and invest in many programs to adopt gifted students providing them with challenging activities. Intellectual giftedness is founded on fluid intelligence and extends to more specific abilities through the growth and inputs from the environment. Acknowledging the roles played by the environment in the development of giftedness leads to an effective nurturing of gifted individuals. Further, giftedness requires a context that enables it to develop. However, no study has investigated the direct and indirect effects of environment and fluid intelligence on intellectual giftedness. Thus, this study investigated the contribution of environment factors to giftedness development by conducting tests of fluid intelligence using CCFT and analytical abilities using culture reduced test items covering problem solving, pattern recognition, audio-logic, audio-matrices, and artificial language, and self report questionnaire for the environmental factors. A number of 180 high-scoring students were selected using CCFT from a leading university in Malaysia. Structural equation modelling was employed using Amos V.16 to determine the direct and indirect effects of environment factors (family, peers, teachers, school, society, and resources) on the intellectual giftedness. The findings showed that the hypothesized model fitted the data, supporting the model postulates and showed significant and strong direct and indirect effects of the environment and fluid intelligence on the intellectual giftedness.

Introduction

Environment plays an essential role as an incubator hold the energy, direction, and feedback which give the gifted opportunities to manifest their potentials, and support constructing connections between the fluid intelligence and crystallized intelligence through social interfaces (Al-Shabatat et al., 2008). However, giftedness requires social context that enables it to develop and individuals' aptitudes need nurturance and support. The child surrounded environments such as family, peers, school, and community, beside the social, economical, and political institutions can help to determine the field of talent that society expect to be achieved (Tannenbaum, 1991). However, researchers advocating the environment, or nurturing, account of talent development promoted the belief that appropriate environmental conditions could lead to the development of giftedness to become into talent. Individuals' dedication to their activities is typically accompanied by great sacrifices for both the individuals themselves and their families, they are surrounded by others, who support and nurture their talent. Further, families, peers, and teachers play an essential role in the development of expertise (Bloom, 1985; Csikzentmihalyi et al., 1993; Feldman, 1986; Winner, 1996).

Environment has been studied through two levels; micro-level (e.g. family, personality givers, socioeconomic) that children interact with their families, peers and school (Amabile, 1983; Csikzentmihalyi & Rathunde, 1998; Gottfried, Fleming, & Gottfried, 1998; Wachs, 1992). Second is the macro-level (e.g. demographic, sociological) which helps to shape environments as a larger socio-historical milieu (Li, 1997). Bloom (1985) demonstrates that the role of families is vital in nurturing individuals' talents. In his study, the individuals participating defined their families as greatly child-centered in which parents offer efforts to support their talent development. For example, they would work more than one job to pay for private skating lessons, or make extra efforts in order to be closer to training facilities. Indeed, as Csikzentmihalyi et al. (1993) stated that *when the child's abilities are truly prodigious, parental and social investments need to be prodigious as well* (p. 26). Therefore, parents must provide the right nurture stimulation at the right time according to the genetic trait of the child in order to give a greater chance for the child to achieve giftedness (Haensly, 2004).

Parents tend to set high standards for their talented children rather than their emotional and financial support (Winner, 1996). Parents also support their children to challenge, to strive for increasingly higher levels of achievement and evaluate the success of their performances (Bloom, 1985). According to Zimmerman and Ringle (1981), talented children's levels of achievement and personal ambitions are affected by the goals parents set for them. Thus, the best environments for cultivating talent challenging are provided by supportive families (Csikzentmihalyi et al., 1993). Moreover, the behaviours parents' model influences children's talent development (Bloom, 1985; Winner, 1996). For example, children closely notice the way in which parents conduct themselves, and they garner many parental values. In addition, parents also can teach children industriousness and perseverance by working hard themselves. Indeed, Zimmerman and Ringle (1981) found that the length of time children were keen to work on a similar situation, influence the duration of an adult model's persistence on a task significantly.

Competitive and supportive peer groups can serve to promote the intrinsic value of school and the educational process in its members (Ryan, 2001). The influence of the peers is quite considerable outside the classroom. Peers have an influential effect on attitudes and concepts (Guimond, 1999). Children's peers also support the development of talent (Bloom, 1985). However, talented children often tend to spend their time alone and with parents more than with than non-talented children, because they feel isolated from mainstream peers (Csikzentmihalyi et al., 1993; Winner, 1996).

Even parents themselves often feel alone and unable to talk with friends about their parenting experiences and their children's development (Delisle, 2002a; Webb & DeVries, 1998). Moreover, talented' peers themselves are varied in terms of their developmental and social goals. For example, a child whose central ambition is often looking for peers of similar ability to chase her/his talent development. These children flourish when encircled by peers that challenge, support, and legitimize their talents. On the other hand, the tendency to interact more frequently with non-talented children accompanied by a proclivity that often consequences in a lessened desire to achieve by talented whose main goal is to be sociable (Feldman, 1986).

Teachers also play an important role in the development of talent (Bloom, 1985; Csikzentmihalyi et al., 1993). Instructional environments affect the ways in which children are motivated to participate and excel in their activities. Teaching styles characterized by clear rules for achieving distinction, controlled decision-making, and public performance evaluations promote extrinsic motivation in children. On the other hand, teaching styles that highlight student participation in evaluations of success and decision-making processes encourage intrinsic motivation and autonomy (Eccles et al., 1998).

Triarchic Theory of Human Intelligence

Sternberg (1985) identifies three kinds of giftedness including analytic, synthetic and practical giftedness. The identification includes assessment through observation of a student's ability in these three areas. Teachers may then design opportunities for students demonstrating analytical, synthetical and/or practical abilities. According to Sternberg (1985), people with analytical giftedness can analyze and understand problem elements, and this kind of giftedness might be tested by traditional tests for intelligence, such as testing analogies, synonyms and matrix problems. The second type is synthetic giftedness, which might be noted on the people who are creative or tend to deal with discovering and inventing. Unlike the first kind of giftedness, this kind might not be measured by the traditional tests of intelligence. The third type of giftedness is practical giftedness, people who are practitioners have a propensity to apply and implement what have been analyzed or synthesized, with an investment of environment situations. The analytical abilities were investigated in this study by measuring the effects of general abilities *g* and the environmental factors on this element of intellectual giftedness.

Methods

Participants

The study involved one hundred and eighty students (age 19 -20) in the schools of Mathematics and Computer Science at a leading university in Malaysia. Students were selected through lecturers' nominations and exceeding the cut-off point of 35 of the raw scores of CCFT. A total of 210 students were nominated by their lecturers as good to excellent first-year students at these schools. The Cattell Culture Fair Test (CCFT) was then administered to identify the potentially gifted students. Since CCFT can be administered by groups, the nominated students (210) were divided into five groups and tested according to the test manual. Out of the 210 students, only 180 exceeded the 35 cut-off point of CCFT raw scores and were chosen for the study. The analytical test was administered the following week through two sessions with a refreshment break. The environment questionnaire was administered immediately after the students had completed the analytical test.

Measures

Cattell Culture Fair Intelligence Test (CCFT)

The test consisted of four types of spatial problems administered according to a set time. All four subtests of geometric figures are intended to give the widest range of perceptual relation-educing operations possible. Each subtest begins with three practice items. Test items are graded in order of increasing difficulty following an *easy-to-grasp* item to start off with (Cattell & Cattell, 1960). To score performance on the test, one point is given for each correct item. A total score out of 46 is calculated. The test can be given either as a group test or as an individual test using exactly the same instructions and time limits. The test is considered to have low knowledge dependence, thereby making it a reliable test for measuring general intelligence *g* despite socioeconomic status, educational background, and cultural upbringing of any participant.

Analytical Abilities Measure
To measure the analytical abilities 30 items were developed and validated prior to the time of conducting this study. These items were subjected to factor analysis which revealed five factors with Eigen values greater or equal to one while three items were dropped due to cross loadings (> 0.30). Further the items were subjected to reliability scale to calculate the internal consistency; Spearman-Brown technique was used to calculate the reliability coefficient for the analytical abilities items. The internal consistency measuring the reliability of the analytical abilities measure using Spearman-Brown was ranging from 0.70 to 0.79 and the overall coefficient for the scale was 0.73. These values show high reliability indices which support the appropriateness of the instrument as shown in Table 1. According to Nunnaly (1967), a value above .70 is considered as highly reliable.

Table 1: Summary of Internal Consistency Indices for the Ten Factors of the Analytical Abilities

N	Factor	Valid Items	Spearman-Brown
1	Problem Solving	7	0.74
2	Pattern Recognition	7	0.72
3	Artificial Language	4	0.79
4	Audio-Logic	5	0.70
5	Audio-Matrix	4	0.77
Total		27	0.72

Pattern Recognition
This section contained two parts. The first part is composed of two items require from the respondents to recognise a shape given on the top of the questions within a list of choices attached to the questions. The shapes are similar to the required shape but only one accurate shape matches the given shape that is needed to be identified out of the given choices. Item number three of the test was conducted through computer flash application. A shape was given to be identified out of a number of shapes. When identifying the correct choice of the shape, it will be removed from the arranged given shapes. Then another shape was given and so on. All the given shapes were constituted of geometrical figures ordered from easy to difficult. The second part of this test consisted of four items with auditory contents. Respondents were asked to hear a musical sound then to match it to the similar sound form the given options. All sounds have the same rhythm but differed in their pitch.
Problem Solving
This section is composed of seven items. Items number one, two, three, and four have primitive indices followed by dilemmas, however, the solutions for the proposed problems was covered by irrelevant remarks. Respondents have to go backward and forward through the primitive indices for the situations connecting the relative indices and eliminating the irrelevant ones seeking for the correct solutions. The correct answers or choices were attached to each item. Items number five and six have weight measurement contained grading system on each side of the scale. The weight was known but the concentration or scaling point to figure out the needed weight on the other side of the scale to achieve balance. Items number seven and eight include two maps, on the right side; they contain an indicator for the direction along with four symbols. The directions and symbols are [a star; indicates the east, triangle; indicates the north, square; indicates the south, and a circle and triangle indicate to the north-west direction]. Respondents were given instructions in each question to move according to the provided symbols. Each move was designed for one intersection included in the map. Respondents were required to identify the place that the symbol indicates on the map. The symbol indicated the correct given place in the choices attached to the items within a number of other places symbolised on the map.

Audio Matrices

This section consisted of four items; each item has a series of sounds presented in a progressive form. Sounds were manipulated professionally using computer sounds application (Sound Forge V.8) to be varied in their pitch. Respondents were asked to choose from the given options the correct sound that should be added to complete the matrix.

Audio-Logic

The audio-logic items require the use of the deductive logic which involves drawing conclusions based on sets of premises that are assumed to be true. Deductive reasoning involves the use of two or more premises, which may be rules, laws, principles, or generalizations, and forms a conclusion based upon them. In order to be valid, a deductive argument must have premises that are true and a conclusion that logically follows from those premises, without trying to go beyond them. When individuals understand how these arguments work, they will know how to construct their own strong arguments. This section consisted of five items, each item introduced premises represented by sounds, respondents are asked to draw a correct conclusion by getting use of the provided premises from the sounds, and the correct conclusion (answer) was given in item answer options. The following is an example of audio-logic items:

> *Premise (1):* If *North-East* is represented by *the sound (A)*
> *Premise (2): North-West* is represented by *the sound (B)*
> *Premise (3): South-East* is represented by *the sound (C)*
> What sound could indicate to *South-West?*

Sound **A** in the first premise consisted of two distinct musical notes (X: indicates North, Y: indicates East). In the second premise, sound B also is composed of two distinct musical notes, namely, X that indicates North, and a new note Z that indicates West. In the third premise, sound **C** is composed of another pair of notes, i.e., W that indicates to South and Y that indicates East). Thus the sound which indicates South-West must be W & Z the pair of notes. In order to solve such a problem, a high level of sound recognition, an ability to keep holding the various notes for a long time in the working memory, and the abilities to build logical linkages and connections among the premises to draw the conclusion are required.

Artificial Language

This section consisted of six items. It was developed to measure the qualitative reasoning into two different levels (average and advanced). The average level includes two logical introductions (premises) require from respondents to find out the result (conclusion) following the logical indicators of the premises. The advanced level involves three logical premises require from the respondent to find out the possible conclusion from the given six multiple choices attached to each item.

Environment questionnaire

A number of 36 items were developed and validated in form of self rating scale to identify students' environment status using Likert scale (1-5) ranging from *very frequent* to *never*. The items were distributed on eight factors encompass the environmental status perceived by the gifted students. All the items were structured of informative sentences aim at measuring the amount or strength of value that the respondents have regarding their environment elements (family, peers, teachers, school, society, and resources). Items were built through exhibiting the conduct related to the findings of the gifted and talented as in several studies (e.g. Bloom, 1985; Csikzentmihalyi et al., 1993; Winner, 1996; Feldman, 1986). The internal consistency measuring the reliability of the environment factors using Cronbach's Alpha was ranging from 0.71 to 0.83 and the overall coefficient for the questionnaire was 0.89. These values had shown high reliability indices which support the appropriateness of the instrument as shown in Table 2.

Table 2: Summary of Internal Consistency Indices for the Six Factors of the Environment Questionnaire

Factor	**Valid Items**	**Chronbach's Alpha**
Resources	6	0.71
Family	6	0.83
Peers	6	0.74
School	6	0.75
Society	6	0.75
Teachers	6	0.79
Total	36	0.89

Results

Evaluation of SEM Assumptions

Multicollinearity refers to a high correlation among a set of variables within a specific construct. Hair et al. (2006) suggest that the value greater than 0.9 of correlation coefficient creates multicollinearity problem. Although some of the variables for this research are highly correlated, they fell within the acceptable range (< 0.9) suggested by Hair et al. (2006) as shown in Table 3. There was no evidence of multicollinearity of the variables so all these variables were used for further analysis. Prior to the SEM analysis, the assumptions for SEM were evaluated. Reliability coefficients (Cronbach's alpha) were computed to access the reliability of the indicators for all observed variables. The results showed that the measures used for the current study had adequate to excellent internal reliability. The sample covariance matrix value was evaluated to confirm multicollinearity and to determine if singularity problems existed. A high value of determinant on the sample covariance matrix (1.567) was found in the Sample Moments section and it was larger than zero. Therefore, there was no singularity problem among the tested variables. No further rescaling was required for the current data. A skewness range from -0.268 to 0.467 was well below the suggested level of the absolute value of 3.0. In addition, a kurtosis range from -0.322 to.945 revealed that the variables are not overly peaked and well below the absolute value of 10.0 as suggested by Chan (2003). Thus the presented values reveal that the variables are normally distributed and have met the criteria for the SEM analysis.

Evaluation of the Measurement Model: Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis CFA was carried out to determine the adequacy of the factor loadings and the standardized residuals and explained variances for the measurement variables. Figure 1 presents the measurement model for the variables. For this constructed measurement model, all factor loadings are freed (i.e., estimated); items are allowed to load on only one construct (i.e., no cross loading); and latent constructs are allowed to correlate (equivalent to oblique rotation in exploratory factor analysis EFA).

Table 3 shows the elaborated evaluation of the measurement model parameters. All standardized regression weights were significant with CR > ± 1.96, p < 0.05 and all the error variance were < 1.0 indicating that there was no violation of estimates revealed. The standardized regression weights range from 0.278 to 0.770. These values indicate that the 15 measurement variables are significantly represented by their respective latent constructs. The explained variances for the 15 measurement variables are represented by their squared multiple correlations (SMC), the higher the value of the squared multiple correlation, the greater the explanatory power of the regression model. The percentage of variance explained range from 0.129 or 12.9 % (Artificial language) to 0.593 or 59.3 % (Pattern Recognition) as shown in Table 3. SMC results indicate a strong relationship between the constructs and their factors and demonstrate the greater explanatory power of these factors in predicting these compounds.

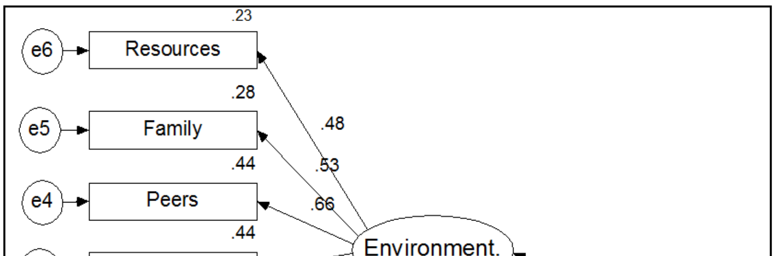

Figure 1: The Measurement Model with the Factor Loadings

Table 3: Maximum Likelihood Parameter Estimates of the Standardized Factor Loadings, Standard Error, Critical Ratio, and Squared Multiple Correlation for Measurement Model

Parameters			Estimate	S.E.	C.R.	SMC
Teachers			0.657	-	-	0.432
Society			0.743	0.130	7.292	0.552
School			0.665	0.154	6.325	0.442
Peers			0.664	0.138	6.619	0.441
Family			0.533	0.146	5.548	0.284
Resources			0.475	0.178	4.746	0.226
CCFT Series			0.452	-	-	0.205
CCFT Classification			0.535	0.326	3.784	0.287
CCFT Matrices			0.278	0.298	2.323	0.177
CCFT Topology			0.657	0.401	3.681	0.431
Problem Solving			0.547	-	-	0.299
Pattern Recognition			0.770	0.216	5.906	0.593
Audio logic			0.489	0.130	4.668	0.239
Audio matrix			0.763	0.206	5.968	0.582
Artificial language			0.359	0.115	3.602	0.129
Covariances						
Environment	<-->	g	0.754	0.243	3.107	
g	<-->	Analytical	0.308	0.102	3.010	
Environment	<-->	Analytical	1.135	0.285	3.990	
Correlations						
Environment	<-->	g	0.530			

g	<-->	Analytical	0.544
Environment	<-->	Analytical	0.639

Examination of the Modification indices MI did not give any suggestions to modify the measurement model. As the adequacy of the measurement model was supported by parameters estimates, the directions of the estimates were theoretically justifiable. In other words, the three latent variables in the measurement model, namely, g, analytical, and environment are theoretically represented by their constructs. Many scholars such as Cattell and Cattell (1960) identify the components of the fluid intelligence as the ability of classification, deductive reasoning, inductive reasoning, and manipulate conditions (topology). Further, Carroll's (1993) conception of high order intellectual abilities (stratum II) are consisted of the sequential reasoning (premises or conditions to conduct one or more steps of reasoning to draw a conclusion), induction (to find out the rules that direct the similarities or contrasts), quantitative reasoning (using concepts including mathematical relations to reach a correct conclusion), Piagetian reasoning (abstraction), visualisation (to manipulate visual patterns), and originality/creativity (original verbal/ ideational responses). And for the environment latent variable, numerous scholars (e.g. Bloom, 1985; Csikzentmihalyi et al., 1993; Winner, 1996; Feldman, 1986) present gifted' environment in terms of family, peers, teachers, school, society, and resources which were confirmed in the measurement model as one latent variable named environment.

Assessment of Model Adequacy for the Competing Model

The competing model has been analyzed using Amos V.16 with Maximum Likelihood Estimation (MLE) as shown in Figure 2. Table 4 shows the results for Goodness-of-Fit Indices (GFI) for the competing model.

Table 4: Results of Goodness-of-fit Indices of the Competing Model

Goodness of fit indexes	χ^2	df	χ^2/df (CMIN/df)	P	CFI	GFI	TLI	RMSEA
Recommended value	-	-	< 3.0	>.05	> .90	> .90	> .90	< .08
Model	118.819	87	1.366	.063	.936	.906	.923	.050

The model adequacy has indicated that a statistically fit structured model with root mean square error of approximation (RMSEA) = .050 (<.08), comparative fit index (CFI) = .936 (> .90), Tucker-Lewis index (TLI) = .923 (> .90) and the overall good fit index (GFI) = .906. Moreover, the chi-square statistics of (χ^2 = 118.819, df = 87, P = .063) and relative chi-square (CMIN/df = 1.366) which fell below the threshold point of 3.000 as suggested by Kline (2005).

Table 5 shows the elaborated evaluation of the competing model parameters. All factor loadings were significant with CR > ± 1.96 and all the error variance were < 1.0 indicating that there was no violation of estimates revealed. The direct effect of environment on g was 0.530, environment on analytical abilities was 0.488, and g on analytical abilities was 0.285. All direct effect were significant paths (CR > ± 1.96).

As the paths coefficients > 0.20, the effects of the environment are considered important to the analytical abilities. Further, the direct relationship between the environment and the analytical abilities was significant (CR > ± 1.96, p < 0.05) with path coefficient of 0.448. As the path coefficient > 0.20, the effect of the environment is considered important to the analytical abilities. On the other hand, the indirect effect of environment on the analytical abilities through the g was 0.151. The total standardized effects for environment on the analytical abilities was 0.639 and on g was 0.530, the total standardized effects for g on the analytical abilities was 0.285. These results indicated that the external nurturing factors embodied in Environment had strong effects on the analytical elements of the intellectual giftedness.

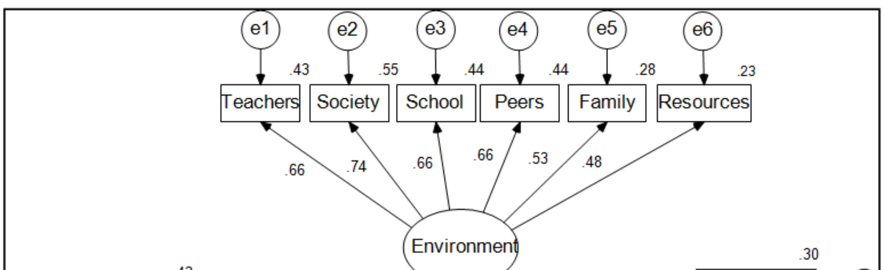

Figure 2: The Competing Model with the Factor Loadings

Table 5: Summary of the Direct and Indirect Effects, Total Effects, Standardized Error, and Critical Ratio of the Competing Model

Standardized Direct Effects			**Estimate**	**S.E.**	**C.R.**
Environment	→	g	0.530	0.050	3.374
Environment	→	Analytical	0.488	0.056	3.466
g	→	Analytical	0.285	0.189	1.886
Standardized Indirect Effects					
Environment	→	Analytical	0.151		
Standardized Total Effects (Direct Effects + Indirect Effects)					
Environment	→	g	0.530		
Environment	→	Analytical	0.639		
g	→	Analytical	0.285		

The percentage of variance (SMC) explained range from 0.129 or 12.9 % (Artificial language) to 0.593 or 59.3 % (Pattern Recognition). The amount of variance associated with g accounted for 0.281 or 28.1 % by its predictors, namely, CCFT series, CCFT matrices, and CCFT topology. The amount of variance associated with the analytical abilities accounted for 0.467 or 46.7 % by its predictors, namely, problem solving, pattern recognition, audio-logic, artificial language, and audio-matrices as shown in Table 6. SMC results indicated a strong relationship between the variables' constructs and their factors and demonstrate the greater explanatory power of these factors in predicting the intellectual giftedness. Examination of the modification indices (MI) did not give any suggestions to modify the competing model. As the adequacy of the competing model was supported by parameters estimates, the directions of the estimates were theoretically justifiable.

By examining paths coefficients among the latent variables in the competing model, one latent variable revealed a strong bond among them, namely, environment, g, and analytical abilities. This bond was supported by calculating the direct and indirect effects among these variables. The direct effects were: environment to g = 0.53, environment to analytical abilities = 0.49 and *g* to analytical abilities = 0.29. The indirect effects were: environment to analytical abilities = 0.488 as shown in Table 3. This bond was named analytical giftedness; the existence of this bond was due to the crucial roles played by environment to crystallize these compounds (g and analytical abilities). This role is mediating by g platform which supports the analytical abilities to be maximized.

Discussion and Conclusion

The findings of this study are consistent with Gagne’s (1985) DMGT model, Tanenbuam’s (1991) Star model, and Sternberg’s (1985) Triarchic model. The beauty of the current findings stand on counting the contribution of environment factors (family, peers, teachers, school, society, and resources) to the development of the intellectual giftedness. No study utilized multivariate analysis using SEM to investigate the interrelationships of the environment factors, the fluid intelligence, and intellectual giftedness. Further, the concept of giftedness and talent is now varied based on the incubating environments of the intellectual giftedness. However, the previous models of giftedness and talent (e.g. Gagne’s (1985) model) describe giftedness in terms of high ability and talent as high performance, while

Table 6: Maximum Likelihood Parameter Estimates of the Standardized Factor Loadings, Standard Error, Critical Ratio, and Squared Multiple Correlation for Measurement Model

Factor Loadings		S.E.	C.R.	SMC
Teachers	0.657	-	-	0.432
Society	0.743	0.130	7.292	0.552
School	0.665	0.154	6.325	0.442
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Audio logic	0.489	0.130	4.668	0.239
Audio matrix	0.763	0.206	5.968	0.582
Artificial language	0.359	0.115	3.602	0.129
g	0.530	0.050	3.374	0.281
Analytical	0.285	0.189	1.886	0.467

it can be redefined by prescribing these concepts in depth showing how a specific series of aptitudes combined in a certain way to establish g , analytical abilities, or any other areas of giftedness and talent. Further, the foundation of talent can be redefined by having these compounds connected to internal and external factors, namely motivation and environment to establish the bonds as talent foundation. This conceptualization is consistent with Cattell-Horn-Carroll (CHC) model (McGrew, 1997) as crystallized intelligence extends the fluid intelligence capabilities by having a context, which encompasses motivation and environment factors.

Environment as a nurturing tool plays a crucial role in the development of giftedness to become a distinguished talent. The evaluation of the competing model parameters in terms of the direct, indirect, and total standardized effects gave a significant direct effect of environment on g and analytical abilities. These results are consistent with Bloom (1985) and Carlson (1993), in which talent development is supported by several factors such as good teachers, potential support, sport clubs, socialization, playful activities with guidance, support from parents, and stimulation of interest. Environment gives the gifted opportunities to manifest gifted potentials and to supports individuals’ aptitudes to be nurtured through various interfaces. Additionally, giftedness requires social context that allows individuals’ abilities to be flourished. The analytical abilities are affected by the environment factors, which is consistent with Tannenbaum (1991) that child’s environments such as family, peers, school, and community, beside the social, economical, and political institutions can help to determine the field of talent.

The family factor loading in the structural model was significant ($CR > \pm 1.96$, $p < 0.05$), and this highlights the important role of parents as emphasized by Bloom (1985) in his studies as the role of families is vital in nurturing individuals’ talents and parents offer efforts to support their talent development. The Environment’ items developed in this study followed the theoretical foundations of the role of parents proposed in the literature. For example, Winner (1996) suggests that parents tend to set high standards for their talented children rather than their emotional and financial support, while Bloom (1985) emphasized that parents support their children to challenge, to strive for increasingly higher levels of achievement and to evaluate the success of their performances. Zimmerman and Ringle (1981) demonstrate that talented children's levels of achievement and personal ambitions are affected by the goals parents set for them. According to Csikzentmihalyi et al. (1993), the best environment for cultivating talent challenging is provided by supportive families. Bloom (1985) and Winner (1996) reported that the behaviours parents' model influences children's talent development which is consistent with results of this study.

The peer factor loadings in the structural model were significant (CR > ± 1.96, $p < 0.05$) and this indicates that the important role of the peers in giftedness development. This result is consistent with Ryan (2001) in which the competitive and supportive peer groups can serve to promote the intrinsic value of school and the educational process in its members. Also it is consistent with Bloom (1985) and Guimond (1999) as children's peers support the development of talent and have an influential effect on attitudes and concepts. Sichivitsa (2004) found peers to play a significant role in shaping students' values and attitudes toward music. The teachers factor loading in the structural model was significant (CR > ± 1.96, $p < 0.05$), and this indicates the important role of teachers play in the development of giftedness, which in turn consistent with Bloom (1985), Csikzentmihalyi et al. (1993), and Sichivitsa (2004) who found that teachers play a crucial role in improving both academic and social integration of their students, parental support of music and the amount of previous musical experience had a significant positive impact on college students' self-concepts in music.

A multivariate analysis employing the structural equation modelling (SEM) to explore the simultaneous interconnections and relationships between fluid intelligence, analytical abilities, and environmental factors was used in this study. The main focus of this study was to investigate how these factors interacted so that the administration of the gifted and talented education and the role of parents and other environmental factors can be enhanced. The findings of this study indicated that the availability of supportive environments promoted higher analytical abilities and suggested that environmental factors were integral and significant variables in the further development of gifts and talent. Thus, these findings provide support for the belief that with proper environmental scaffolding *everyone can be talented* and these findings can be helpful for planning and conducting the identification and nurturing processes of gifted and talented individuals. However, more studies that explore the characteristics of the environmental factors in promoting other intellectual, emotional, and psychomotor intelligences are recommended.

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