

The comparative study of general intelligence and scholastic in urban, highland and coastal students

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ABSTRACT

This study aims to determine: i) differences in general intelligence students in the urban, highland, and coastal, ii) scholastic differences students in the urban, highland and coastal, and iii) the relationship of general intelligence and scholastic students urban, highland and coastal. Samples were taken by using purposive sampling techniques as many as 670 students from the urban, 764 people from the highland and 604 students from the coastal. Analysis data used descriptive analysis, analysis of variance followed by Tukey honestly significant difference (HSD) analysis, and regression. The results showed that 31.4% of students in the highland have a general intelligence above the average of their age students, while students who live in the urban with a general intelligence above average age is only 23.3%, while on the coastal is only 8.1%. It was found that; i) there are differences in general intelligence of students, ii) there are differences in scholastic ability of students, and iii) there is a general intelligence effect to scholastic ability students in the urban, highland and coastal.

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1. INTRODUCTION

Intelligence used in this paper is a concept of the ability of individuals to adjust to their environment. Research by Cattell [1] says intelligence as the ability to acquire knowledge or understanding and use it in new situations. Intelligence is the ability to learn or understand, although everyone has intelligence, it varies for everyone. Watkins and Canivez [2] defines intelligence as a set or totality of a person's ability to learn, act with a particular purpose, think rationally, and face his environment effectively. Research by Sternberg [3] defines intelligence as a purposeful and adaptive action or thought. According to Thurstone [4] the intelligence specification consists of comprehension, verbal ability, count, visual ability, memory, reasoning, perceptual speed. The higher the level of one's intelligence, the more likely it is that one performs multiple tasks; demands reason and reason and performs complex tasks.

Intelligence can be classified into two primary categories, namely: general (G) and specific (S). The G factor represents cognitive abilities that individuals possess universally, such as memory and reasoning. In contrast, the S factor refers to specialized abilities unique to individuals and influenced by their environment,

resulting in varying levels of intelligence among different individuals [5]. Research by Anastasi and Urbina [6] says general intelligence is an expression of the level of individual ability at a given moment, in relation to the existing age so that intelligence is not a single ability, but a collection of experiences. Broadly inferred intelligence is a mental ability that involves the process of thinking rationally. Therefore, intelligence can not be observed directly, but must be concluded from the various concrete actions that are manifestations of the rational process of thinking.

The cognitive development of children is strongly influenced by the social interactions of peers and adults. Several studies have found that the socio-economic level correlates with the performance of individual intelligence [3], [7]–[10]. Individuals with higher education will have a higher intelligence score than those with low education. Another unique finding is that the level of parental education correlates with children's intelligence, another aspect is the child-rearing style, the family's and teacher's interactions. In another study [8], [11] found that religion and prosperity systematically influenced different groups' values and attitudes from different countries. Cognitive development will emerge from the form of cultural strength and direct the development of language, cognitive, and personal abilities [12]. McNicol and Armour-Thomas [11] suggests that the various dimensions of human development are reciprocal relationships so that factors that affect one dimension tend to influence other dimensions of a developing person.

Progressivity social experts insist that education should be based on the principle that children are part of society and that learning is social [13], [14]. Schools should promote what is social in the minds of children developing individually. The social progressivism approach says that the self-regulatory system, whereby children are linked, means that children will get their needs and interests from the community and they will follow them, so that they will benefit from society [12]. Pure social progressivism thinks that child development, as part of society will always be a process of self-improvement. One of these flow figures Vygotsky has spent his time on receiving children and guiding children according to the needs and interests of the child [12], [14]. Institutionally working on social development, the child organizes the class with mixed ability, as this makes better social relationships between the children and thereby coexisting helps the development of all better.

Education should be based on the principles that children are part of society and social learning. Schools should encourage social development in children to develop individually. Teachers need to find information about what children need for the interest of the child because the child exists as part of the community. Cross-cultural research has shown that in different areas of culture [1], [8], [11], [15]–[18]. An area that does not provide numeracy and conservation lessons then children raised in the area will not know about the concept of these two things. Children learn not only learn from habits or associations, but also thoughts, meanings and cognitions. Intellectual performance between different cultural groups on the grounds that the action fulfills at least four criteria implicitly: i) the item does not support a particular cultural group; ii) assess the cognitive abilities underlying intellectual behavior; iii) sufficient tasks may deploy certain mental operations; and iv) accurate interpretations can be made from comparing the average Intelligence scores of different cultural groups [1], [10], [17], [18].

Research by Boykin [19] say that there is a difference in learning experience from majority groups with minority groups. Although some school-to-child learning experiences are partially similar to minority groups, especially those from low-income family backgrounds [20]. Although, if the intelligence test items reflect prior learning experiences of minority groups are included in the early stages of item development. Thus, in the selection process, intelligence test items are not biased against minority groups [21]. Falk *et al.*, [22] mentioned that the same test can measure children from different backgrounds of income processes. Similar concerns expressed by Farnham-Diggory [16] suggest that the number of cognitive processes in Thurstone Primer. The ability of the test makes it difficult for children to determine which parts of the process are causing difficulties for children of African descent. Thus, when the standard intelligence testing between the cultural groups is conducted, inaccurate assumptions about aspects of tasks that require dissemination of mental processes can be performed. In other words, differences in cognitive processes may be a function of variability in the task dimension in a particular cultural context. Some psychological factors that influence relevance behavior, i) cultural values, attitudes, and behaviors that distinguish ethnic or racial groups, ii) perceptions of identity, the meaning of individuals in an ethnic group or race, and iii) experience related to minority status [11].

A comparison of the average intelligence test scores of black and white children is equally problematic when using at a race session to create a group classification [11]. Research by Rossier and Duarte [17] notes that great variations exist in black and white children because: i) voluntarily interracial procreation, ii) the researchers' inclination to assign subjects to one group or another on the basis of appearance physical, iii) the decision of some racial or ethnic group is seen to appear, and iv) the possibility that immigrants would be considered black if they were born of the same breed in this country classify themselves as white or other than black. The tester also needs to record events during the school tests, information on questions such as: i) Do the examinees have diseases that can prevent them during the test?;

ii) is tester proficient in Indonesian language?; iii) does prenatal tester experience possibly affect performance on intelligence measures?; iv) are there factors in cultured examination (e.g., time conception, familiarity of test content, response style) that may affect performance on the test?; v) are there factors at home (e.g., literacy levels, educational values) that could affect the motivation of examinees during the test situation? [11].

Anticipating cultural influences, psychometric experts devised a nonverbal intelligence test as a free test culture and culture fair test, developed to reduce the content of language and cultural content occurring in tests [1], [6], [15], [23]. However, differences in socio-cultural forces influence in the lives of some children and their families, as well as differences between home and school cultures, have provided an explanation of educational achievement. The process of socializing children from high-class dominates gaining knowledge, skills, language competence and interaction style of children is different from children from low class background [24]. Because the children's culture of the high class provides an educational system for academic success through educational programs. Schools implicitly reward culturally and systematically. In contrast to the low-class children ignore or reduce these values.

There is a difference between the thought process between primitive man and civilized man. This distinction is related to the content of the process and is then linked to their local cultural context. He denies there is a difference between races in intelligence. The primitive human intelligence is no different from civilized man, it can be observed from differences in mental processes due to environmental limitations. One of the results of intelligence research is the average of immigrants from various countries, and the conclusion that the mental ability of ethnic groups is also different [5], [25]. In subsequent years, intelligence tests were conducted for mental testing of the abilities of people in America in different cultures. Although some psychologists conclude that some cultures' mental abilities are lower than intelligence in people in America. Cultural trends have the dominant factor of intelligence tests, so the researchers attempt to develop the test of cultural-free intelligence [25]–[27]. The problem is that intelligence tests built within cultures are regarded as an objective measure of intelligence in ethnic groups in some countries and also to measure legitimate intelligence in other countries, many of which are very environmentally and culturally different.

Several comparative studies, which explain differences in intelligence tests are described as differences in intelligence between states, which sometimes lead to generalizations about ethnic differences [5], [16], [19], [20]. The error of this method is often done in intercultural research, intelligence tests, and other psychological tests, built in one culture can only be interpreted and applied to other cultures. Research on cross-cultural cognitive processes has universally discovered the structure of cognitive processes by testing factor analysis. Irvine [23] conducted a meta-analysis study of 91 analytical research factors in several European and North American countries. Factors found in culture are reasoning ability, visual or perceptual process, verbal ability, numerical ability, physical speed, and memory ability. Irvine's [23] findings are in line with Carroll [28], more than hundreds of research results have been conducted, Carroll formed the integration in theoretical framework divided into three levels of cognitive process hierarchy, where the first level is called the general group, the second level with general group factors for the test subset, and the third level with specific capabilities.

Research by Van de Vijver and Poortinga [29] explain that from a meta-analysis of 197 studies with 1,555 independent comparisons, it concluded universally on cognitive performance tests. The absence of cross-cultural differences was found in his studies. The difference from cross-cultural studies of cognitive performance correlates with the level of state prosperity; this difference increases with age and chronological education; greater performance differences on common tasks, with the Watkins and Canivez [2] test performing a major role, compared to native cognitive. Furthermore, the issue of cross-cultural comparison between cognitive skills lies in secondary relevance to more important issues; namely the structural relationship of cognitive skills with culture. Cross-cultural psychology has developed a method for determining the development of intercultural or universal equality, ie whether intelligence tests are built in cultures or intercultural cognitive processes that are structurally equivalent to other cultures [10], [15].

Cultural studies around the world show the variation between the concepts of intelligence and intelligent behavior, in which some cultures emphasize aspects of social intelligence and different perspectives on behavior in society that are intelligent behavior [1], [8], [10], [18]. This means the level of intelligence varies from each culture. In an effort to know the level of intelligence should be measured by intelligence tests. The results of research conducted by Dewi *et al.* [30] show that i) there is no difference in language skills between students in urban and highlands area; ii) There are differences in language skills between students in urban and coastal areas; and iii) There are differences in students' language skills in the highlands and coastal area. Judging from the numerical ability obtained: i) there are differences in the numerical ability students in urban and coastal areas; ii) there are differences in the numerical ability students in urban and highland areas; and iii) there are differences in the numerical ability students in the highland and coastal areas.

This study offers the recent insights regarding intelligence and scholasticism in students who domicile in the urban, highland and coastal areas. Although previous research has discussed a lot about intelligence which is influenced by culture and environment which are the background for different intelligence achievements. The novelty of this study lies in the differences in general abilities and scholastic abilities of students in the urban, highland and coastal areas involving 2,038 students spread over these areas. This study aimed to examine: i) the differences general intelligence of students in the urban, highland, and coastal areas; ii) the differences scholastic ability of students in in the urban, highland, and coastal areas; and iii) the influence general intelligence to scholastic ability of students in the urban, highland and coastal areas.

2. METHOD

2.1. Research design

The quantitative approach is used in this paper with the ex post facto research design, which is a research design in which the investigation begins after the fact has taken place without interference from the researcher [31]. The study was conducted in three locations, namely urban, highland, and coastal areas in the Nort Sumatera, Indonesia. Sampling is done by a purposive technique that is intended to achieve research aims to find out the differences between general intelligence and scholastic ability of students in urban, highland, and coastal areas.

2.2. Participant

The participant consisted of students in the urban area derive from State Senior High School 14 Medan and State Madrasah Aliyah 1 Medan in Medan city. Students in the highland area derive from State Senior High School 1 Kabanjahe and State Senior High School 1 Berastagi in Karo district. Students in the coastal area derive from State Senior High School 1 Sei Suka and State Madrasah Aliyah 1 Kisaran in Batubara district and Asahan district, respectively. The students represented urban area are 670 students, highland area are 764 student, and 604 students for coastal area. The G*Power application was used to determine sample required with the criteria: i) ANOVA was used as a statistical test; ii) total sample size of 2,038; iii) effect size of 0.25; iv) significance of 0.05; v) number of groups are 3; and vi) assuming statistical power at the 1.00 level [32], therefore 2,035 is recommended. The total number of respondents was 2,038 students, this number was sufficient for data analysis.

2.3. Data collection

The research instrument used for general intelligence data collection and scholastic capabilities was used as a standardized test instrument developed by the Ikatan Instrumentasi Bimbingan dan Konseling Indonesia - Asosiasi Bimbingan Konseling dan Indonesia (Indonesia Instrumentation Association of Guidance and Counseling - Indonesia Association of Guidance and Counseling). The validity and reliability of the test instrument has been conducted regularly through a test training program for educational counselors every year [33], [34]. The general intelligence test is to measure fluid ability which is a hereditary factor possessed by someone since birth. General intelligence data collection of students used a test instrument called the culture fair intelligence test (CFIT). The scholastic ability test is a combination of verbal and numerical thinking skills. Students of scholastic ability data collection use test instruments consisting of numerical ability and verbal reasoning instruments. We declare ethical permission for the used of the instrument, because several authors are instructors who obtained permission to use the CFIT, numerical ability, and verbal reasoning instruments.

2.4. Data analysis and procedure

There were ten instructors involved in this research. The instructors are teachers of Guidance and Counseling who have the skills to analyze and used instrumens of the CFIT, numerical ability, and verbal reasoning as proven by having a counselor certificate. The instructor provides instructions for completing the test instrument to avoid confusion among students. Students complete all test instruments consisting of CFIT, numerical ability and verbal reasoning instruments that take 30 minutes, 40 minutes, and 50 minutes, respectively. Gradually, data collection was carried out in each area. Hypothesis test used ANOVA and differences of intelligence and scholastic ability in each region used Post Hoc Tests.

3. RESULTS AND DISCUSSION

3.1. Results

The results of the description of respondents showed the number of respondents was 2,038 students. Respondents were spread in three areas and involved 6 schools. The highest number of respondents came

from the highlands. The number of female participants (56.2%) was higher than male (43.8%) as shown in Table 1.

Table 1. Descriptive statistics respondent

Schools	Urban area		
	N	Male	Female
State Senior High School 14 Medan	310	127	183
State Madrasah Aliyah 1 Medan	360	154	206
Subtotal	670	281	389
	Highland Area		
State Senior High School 1 Kabanjahe	349	152	197
State Senior High School 1 Berastagi	415	191	224
Subtotal	764	343	421
	Coastal Area		
State Senior High School 1 Sei Suka	320	147	173
State Senior High School 1 Kisaran	284	122	162
Subtotal	604	269	335
Total	2,038	893	1,145

The results showed that the percentage of general intelligence above the average of students in the highland area is higher than in the urban and coastal areas. The percentage of general intelligence above the average of highland area students was 31.4% from 764 respondents, while urban area was 23.3% from 670 respondents, and the coastal area was only 8.1% from 604 respondents. In contrast, the percentage of general intelligence below the average in the coastal area is higher than that of urban and highland areas. The percentage of general intelligence below the average of coastal area students was 46.2% of the 604 respondents, while the urban area was 27.3% of the 670 respondents, and the highland area was only 20.5% of 764 respondents as shown in Table 2.

Table 2. Descriptive statistics general intelligence students

Intelligence classification	Urban area*		Highland area*		Coastal area*	
	N	%	N	%	N	%
Above average	156	23.3	240	31.4	49	8.1
Average	331	49.4	367	48.0	276	45.7
Under average	183	27.3	157	20.5	279	46.2
Total	670	100	764	100	604	100

*Note: > 110 = above average; 90 – 109 = average; and < 90 = under average.

Furthermore, scholastic distribution of students from all three locations is not included in the high classification. The results showed that the percentage of scholastic ability in the medium category in the highland area more than urban and coastal areas. Scholastic ability in percentage for medium classification of highland area as much as 8% of 764 respondents, while urban area 4.3% of 670 respondents, and coastal area only 0.8% of 604 respondents. In contrast, the percentage of scholastic ability in the low category in the coastal area is greater than urban and highland areas. The percentage of scholastic ability in the low category was 95.2% of the 604 respondents for coastal area, while the urban area was 95.7% of the 670 respondents, and the highland area was only 92% of the 764 respondents as shown in Table 3.

Table 3. Descriptive statistics scholastic ability of students

Scholastic ability classification	Urban area*		Highland area*		Coastal area*	
	N	%	N	%	N	%
High	0	0	0	0	0	0
Medium	29	4.3	61	8.0	5	0.8
Low	641	95.7	703	92.0	599	99.2
Total	670	100	764	100	604	100

*Note: > 75 = high; 51-75 = medium; and < 51 = low

Based on the research results shown in Table 4, it is used to answer the first and second research aims. First, there are differences in general intelligence of students in urban, highland and coastal areas. This can be seen from the significance and F value of the general intelligence of 0.000 and 100.559, respectively. Likewise, with the second research aim, there are differences in the scholastic ability of students in urban,

highland and coastal areas. This can be seen from the significance and F value of general intelligence of 0.000 and 54.409, respectively. Differences in general intelligence and scholastic ability of students in these three locations significant at alpha 1 percent as shown in Table 4. Using ANOVA, there are significant differences in both general intelligence and scholastic ability among the three research areas (highland, urban and coastal areas). But to see more specific differences between areas, can be seen in Table 5.

Table 4. Differences in general intelligence and scholastic students in the urban, highland and coastal

	F	Sig.
General intelligence	100.559	0.000**
Scholastic ability	54.409	0.000**

** . Significant at the 0.01 level.

Table 5. differences in general intelligence and scholastic interdepartment

Dependent variable	(I) Area	(J) Area	Mean difference (I-J)	Std. error	Sig.
General intelligence	Urban	Highland	-3.030*	0.785	0.000
		Coastal	8.199*	0.832	0.000
	Highland	Urban	3.030*	0.785	0.000
		Coastal	11.228*	0.807	0.000
Scholastic ability	Coastal	Urban	-8.199*	0.832	0.000
		Highland	-11.228*	0.807	0.000
	Urban	Highland	-2.128*	0.517	0.000
		Coastal	3.411*	0.548	0.000
Highland	Urban	2.128*	0.517	0.000	
	Coastal	5.539*	0.532	0.000	
	Coastal	Urban	-3.411*	0.548	0.000
		Highland	-5.539*	0.532	0,000

*. The mean difference is significant at the 0.05 level.

Using t-test results show that there is a difference in general intelligence between students in the urban areas with those in the highland area, where students in the urban area have lower general intelligence than students in the highland area with an average difference of -3.030. However, when compared with the coastal area, students in the urban area have higher general intelligence with an average difference of 8.199. Another finding shows that the average general intelligence of students residing in the highland area is higher than that of students in the coastal area of 11.228. Furthermore, using t-test results showed that there was a difference in scholastic ability between students in the urban areas with those in the highland area, where students in the urban area had lower scholastic ability than students in the highland area with an average difference -2.128. However, when compared to the coastal area, students in the urban areas have higher scholastic ability with an average difference of 3.411. Other findings indicate that the average scholastic ability of students residing in the highland area is higher than that of students in the coastal area of 2.128.

Based on the previous test results that show the rank of general intelligence sequentially are students in the highland area, urban area and coastal area, as well as the rank of scholastic ability, then to test whether there is a link between the two capabilities then tested using linear regression simple with the following results. The test result using simple linear regression equation shows that there is a significant influence between general intelligence on scholastic ability, where the contribution of general intelligence is 0.248 (24.8%) to scholastic ability. The higher of general intelligence, inline with the scholastic ability of students. This provides an answer to the third research aim, that there is an influence of general intelligence on the scholastic ability of students in the urban, highland, and coastal areas as shown in Table 6.

Table 6. Contribution of general intelligence to scholastic ability students

	Coefficient	t-value	Sig.
Constanta	-0.588	-0.480	0.631
Intelligence	0.321	25.887	0.000**
R-square = 0.248			
F-value = 670.122			
Sig = 0.000**			

** . Significant at the 0.01 level.

3.2. Discussion

Based on the results of testing the first research aim, it was found that there were differences in the general intelligence of students who were in the urban, highland, and coastal areas of North Sumatra as shown in Table 4. Furthermore, this difference was traced to the fact that students in the highlands had higher

general intelligence than other areas as shown in Table 5. Strengthening these results can also be proven based on the general intelligence classification of students in the highlands having an intelligence score above an average of 31.4% more than in urban (23.3%) and coastal (8.1%) as shown in Table 2. Differences in general intelligence among students in the three areas according to Piaget theory [35] that cognitive development of children influenced by social situation in family. Norms, living habits, lifestyle, and family social interaction will help the child's cognitive development [36]. Ultimately, academic development in this research called scholastic influenced by social environment and nature. Social environments such as schools, peer groups, homes, and other natural contexts that influence the child's lifestyle and habits. Students' social environment fosters social interaction with peers which can influence their cognitive development [37]. So that the preferences of peers get attention in developing the cognitive potential of children.

School children in the urban area have enough facilities, but on the other hand face a more seductive lifestyle and forget the obligations as students. Students who go to school in highland area with the habit of working hard to get the necessities of life must be even harder to overcome the changes of nature. Therefore, the culture of hard work of students is obtained naturally in accordance with the demands of nature, norms and habits of trained community life, although with these natural conditions many are also not conducive. Children who study in coastal areas tend to work as fishermen rather than studying at school. They view the sea is a source of income that is very close to the environment. Children attending school in all three areas have different views on the socio-economic level. Furthermore, their views also relate to the level of education of their parents [7]–[9], [38].

Testing the second research aim, obtained a significant difference in students' scholastic ability in urban, highland, and coastal areas of North Sumatra as shown in Table 4. Furthermore, differences in the scholastic ability of students in the highland are better than students in urban and coastal areas as shown in Table 5. Table 3 presents data that are in line with the second hypothesis testing, that the classification of scholastic ability at the medium level of students in the highland (8%) is more than students in urban (4.3%) and coastal areas (0.8 %) as shown in Table 3. Scholastic ability in educational attainment was influenced by family backgrounds such as; the father's work that has the greatest impact on educational attainment. Other variables are parental education, number of siblings, disturbed childhood, attitude toward school, and household income. The results support the idea that overall peers consider male students smarter than women and teachers no matter how they dress. This certainly shows that the subtle form of sexism still exists in the public school system and remains part of the culture [18]. Scholastic ability can also be strengthened by learning in the classroom. Collaborative learning that involves students by providing feedback, stimulates students to work together collectively to solve the given problems or new scholastic achievements for students [37]. The scholastic ability gained by students from collaborative learning influences students' academic performance. This becomes so urgent to form students' scholastic ability. So, the learning done by the teacher is very instrumental to improve students' scholastic ability.

Testing the latest research aim, it is proven that there is an influence of general intelligence on the scholastic ability of students in urban, highland, and coastal areas of North Sumatra with a significance of 0.000, t-value of 25.887, and r-square of 0.248. Studies conducted by Cassidy *et al.*, [39] show that various training interventions for children have improved general intelligence and scholastic ability. General intelligence that children have from birth can be intervened to improve their intelligence. General abilities such as intelligence have an impact on increasing their numerical ability and verbal reasoning, both of which are indicators of predicting scholastic ability [2], [40]. Development activities of general intelligence and scholastic ability are mostly carried out in schools so that school assistance is needed to encourage cognitive development that supports children's learning performance, which is largely influenced by the development of intelligence [7], [40]. Other variables that influence test results are the motivation differences of test-takers or students, poor reading skills, inadequate knowledge of mathematics, among other possible reasons [30]. However, it is not possible to provide rules according to the area or race when the test is in progress. The important thing is to follow a standardized procedure for students in order.

4. CONCLUSION

The descriptive statistic shows that the average score of the general intelligence of students in highland is higher than students in urban and coastal. Also, the scholastic ability of students in the highland is better than the other areas. General intelligence testing on scholastic ability concluded that there were significant differences in students in the urban, highland and coastal areas. A more in-depth examination of testing on students' general intelligence found that students in the highland were more dominant than in other areas. Also, the scholastic ability of students in the highland is more dominant than in other areas. While the students who have low general intelligence and scholastic ability are found in the coastal. The implication of this study reveals that students in the coastal really need to get serious educational attention from the

government, which is an area that is a border area. Organizers of public and private educational institutions in the urban and coastal to make various educational efforts more touching on the learning process, both from the application of the education system in families, schools and communities which further builds a culture of hard work that exists in the culture of students in the highlands. A highly recommended study that could be looked at in the future would be about the strategies to strengthen the education of students in the coastal.

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