

Performance in Basic Mathematics of Indigenous Students

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Abstract-This analytical study aimed to evaluate the performance in basic mathematics of the indigenous students, the Aeta (native of Luzon) and the Pulangiyan students (Malaybalay, Bukidnon, Mindanao) with mainstream students in rural, urban, private, and public schools and analyzed their weaknesses and strengths. Data were gathered using a teacher-made test in basic mathematics. The test was adapted to the respective setting's local colors. Results show that the Pulangiyan (grade 6) students were weakest in multiplication (50.95%) and strongest in addition (85.7%). The grand mean for computational skill is 68.2% and for problem solving, 71.1%. Among the Aeta students, the most learned skill was addition with 84.42 mastery level, while subtraction was the least learned with 29.49 mastery level (below average). Computed f for the test of significant difference between groups among Grade 6 students compared to rural, urban, private and public school counterpart was 78.9 ($prob.=0.0$); the Scheffe test identified comparability of Grade 6 students to grade five and grade six students of a private-rural school, and grade four students of a public rural school. On the other hand, the Aeta students only ranked 5th ($f=20.049$) and they were comparable with the grades 4 and 5 students in their school, a rural public school in Capaz, Tarlac. The study recommends that the teachers of conventional schools where indigenous students are mainstreamed, the students should be given extra attention because of their cultural adjustment and deprivation.

Keywords-Indigenous, performance in basic mathematics, Pulangiyan, Aeta

I. INTRODUCTION

The term indigenous people can be used to describe any ethnic group of people who inhabit a geographic region with which they have the earliest known historical connection [1]. The Aetas are from the mountainous parts of Luzon. They are considered Negritos, dark to very dark brown skinned and tend to have features such as a small stature, small frame, curly hair, small nose, and dark brown eyes [1]. The Daweg students from the Bukidnon-Pulangiyan tribe are a group whose ancestry dates back to the early part of the 19th century. This nomadic group, who subsist mostly by hunting and gathering, live along river systems situated in the forest of Mindanao.

Apu Palamguwan Center (APC) was named after an old man who dreamed and other people shared that dream of reading and writing. They built in the last 15 years a cultural education center in Sitiu Bendum, Barangay Busdi, Upper Pulangi. The center works for the Pulangiyan culture; those

who traditionally live along the Pulangi River and marry into neighboring areas [2]. The need for culture based education is being sought by many of these indigenous peoples, not as a second class education but as the primary means of strengthening culture and engaging with great equity in society, while also seeking resource rights and other basic needs [2].

The desire for education by the community in Bendum, now the most northeasterly part of Malaybalay City was without any promise, yet with initiative. The community creatively built a one-room cogon roofed shelter that became their hope for a teacher to appear. They did not know then that future teachers would come from their community. Yet the school did become a reality where people formed a center for education in their own place, in their own time, in their own language for their children. Today these people can laugh and laugh happily knowing they are right to try [3].

On the other hand, the Aetas of Capaz, and Bamban, Tarlac are now mainstreamed with the lowland students in regular elementary schools [4]. Unlike in Bendum, the APC is a makeshift structure maintained by outside workers. It links this marginal community with neighbors and the administrative centers in Malaybalay City [3]. The Department of Education (DepEd) has recognized it as a formal cultural school with its graduates directly accessing high school. For APC, its students are one group of indigenous people.

These indigenous students have one thing in common; they adapt themselves to the educational set up meant to favor the regular students of the communities. Materials are generally written in much broad settings, far different from those which the indigenous children are exposed, a culture alien to them [5]. Thus, this study is an attempt to look into the performance of two groups of indigenous people in a conventional educational setting and context. Their performance on a general subject, mathematics, which is hardly culturally affected, may give cues on how these students regard education.

II. STATEMENT OF THE PROBLEM

This research aimed to evaluate the basic mathematical performance of the Indigenous Students, the Aetas of Capaz, Tarlac and the Pulangiyan students of Apu Palamguwan Cultural Education Center in Bendum, Malaybalay City, Bukidnon.

Specifically, it sought answers to the following questions:

- A. How are the Indigenous students evaluated in terms of:
- A.1. *Basic Computational Skills*
- A.2. *Problem Solving Analysis Skills?*
- B. What is the *mathematical* level of students?
- C. What are *the* causes of students' weaknesses/ strengths?

III. METHODS AND MATERIALS

This study is a review of results reported by Garcia [4] and Dungo [3]. The same instrument was used to gather the data from the students of the two groups of indigenous people. This test is a part of the pool of examinations used by the APC which was administered to the Grade 6 indigenous students of the APC. The same test was given to three to four Grade levels of the following schools: Ateneo de Manila Grade School (private-urban); Loyola College of Culion in Culion, Palawan (private-rural); St. Peter Elementary School in St. Peter, Zamboanguita, Bukidnon (public-rural); and Barangka Elementary School, Barangka, Marikina City (public-urban). These were the comparison schools to pin-point the performance level of the indigenous students.

On the other hand Garcia [4] administered the same test to the grade six Aeta students of Sta. Juliana Elementary School. The same test was also given students of comparison schools, namely: to the grades three to six students of Cristo Rey East Elementary School (public rural) as well as to the grade three to Grade six students of Montessori School of St. Nicholas (private Urban).

The subjects of this study were the 18 Pulangiye Grade 6 Students of the APC and 26 grade six Aeta students.

The test was validated with 50 mainstreamed students with the same grade level. Results of the item analysis indicated that all the items fell within the optimum region (0.45 to 0.75 in terms of difficulty index and .3 and above as to discrimination).

The reliability of the test using the Kuder-Richardson 20 is 94% reliable in terms of internal consistency.

The One Way ANOVA was used to compare the performances of the Indigenous students with regular students. The Scheffe test was used to identify the level of the Indigenous students .

IV. RESULTS AND DISCUSSIONS

A. *Performance of Indigenous Students in Basic Computational Skills.*

Table 1 shows the basic computational skills of the indigenous students in mathematics. The basic skills cover the 4 basic operations and problem solving. Problem solving skills identify the analytical capability of students.

TABLE I. DESCRIPTIVE STATISTICS ON ALL SKILLS MEASURED

Basic Skills	Pulangiye students		Aeta Students	
	Mean	%	Mean	%

Addition	6	85.7	5.77	84.42
Subtraction	4.6	75.9	1.77	29.49
Multiplication	3.1	50.9	2.19	36.54
Division	3.4	57.4	3.19	53.21
Overall Computation skill	17.1	68.2	12.92	51.69
Problem Solving	14.2	71.1	7.85	38.65
Total Performance level	31.3	69.5	20.65	45.90
Mann Whitney U=12; Wilcoxon W= 33 Prob: Z= 0.96; significant				

By comparing the means, the indigenous students of APC had higher performance (31.3 vs. 20.65). The Aeta students failed compared to the APC students. Also noticeable in the table is the higher mean score in all the basic skills. In all the basic skills the Pulangiye Grade 6 got more than 50%. This is equivalent to average performance. The Aeta students failed in subtraction, and multiplication.

The Pulangiye Grade 6 were weakest in multiplication and division, very true-to-form because these two skills are complementary. Without one, a student would not survive in the other. In terms of comparability, the Pulangiye students were significantly better and superior to the Aetas (Prob. Z=0.96).

B. *Mathematical Performance level of the Indigenous Students*

The mathematical performance level of the indigenous students was identified by comparing them with the mainstream students in both urban and rural setting

TABLE II. SCHEFFE TEST FOR THE COMPARISON BETWEEN GROUPS IN MATHEMATICS PERFORMANCE OF PULANGIYEN STUDENTS

	N	Subset for alpha = .05 (Means)				
		Groups with similar Performance Level				
SCHOOL		5 th	4 th	3rd	2nd	1st
Private rural 3	20	10.4				
Private rural 4	20	13.5				
Private rural 5	20		26.6			
Pulangiye 6	18		31.3	31.3		
Private rural 6	20		31.9	31.9		
Public Rural 4	20		32.7	32.7		
Public Rural 5	20			35.9	35.9	
Public Urban S 4	20			38.2	38.2	38.2
Public Urban S 5	20				42.9	42.9
Public Rural 6	20				42.9	42.9
Private urban S 6	20				44.4	44.4
Private urban S 4	20				44.6	44.6
Public Urban S 6	20					44.7
Private urban S 5	20					44.9
Private urban S 7	20					44.9
F=78.978, prob=0.000						

Means for groups in homogeneous subsets are displayed.

a Uses Harmonic Mean Sample Size = 19.853.

b The group sizes are unequal. The harmonic mean of the group sizes is used.

The same test was given to different grade levels of identified schools: public, private, rural and urban. Even the economic status as shown by the stature of the school, being private or public, gave better picture.

Ateneo de Manila provides a private urban school setting for the elitist group of Manila. It has 10 sections per grade level. On the other hand, Loyola College of Culion is an island rural private school. It has 3 sections per grade level.

From Table II, Pulangiyan Grade 6 whose mean score is 31.3 is close to the mean scores of the Grade six students of the private rural school and Grade four students of public rural school. The students had similar performance with the students of rural areas, private or urban. The highest performances were recorded by the Elementary Grades students of Private urban and public urban schools. This gives a picture of better performing students in urban schools. Being well exposed, students in urban setting are performing better being used with the context of learning and language.

To compare the performances of the students from different types of setting, Analysis of Variance was used. The computed F value is 78.98. It is significant at 0.0. This denotes that the groups significantly differed in performances in favor of students of urban schools, both public and private.

The Scheffé test indicates that the Pulangiyan Grade 6 students had equal performances (4th group) with the Grades five and six students of the private rural school, and Grade four students of the public rural school. The indigenous students of Pulingayen had comparable performance level with the rural students in grades 4 to 6, where mean performances were close to each other.

TABLE III. SCHEFFE TEST FOR THE COMPARISON BETWEEN GROUPS IN MATHEMATICS PERFORMANCE OF AETA STUDENTS

SCHOOL	Subset for alpha = .01					
	Groups with Similar Performance Level					
	6th	5th	4th	3rd	2nd	1st
Public rural S 3	15.6 7					
Public rural S 4	16.9 3	16.9 3				
Aeta Students		20.6 5				
Public rural S 5		23.8 3				
Public rural S 6			28. 7			
Private Urban S 3			29. 3			
Private Urban S 5				34. 1		

Private Urban S 4					38. 3	
Private Urban S 6						42. 9
F= 20.049, Prob 0.0						

a Uses Harmonic Mean Sample Size = 19.853.

b The group sizes are unequal. The harmonic mean of the group sizes is used.

To determine the performance level of the Aeta students in mathematics, Table III shows the Scheffe test for the Comparison between Groups.

The Aetas had comparable performance with the Grades 4 and 5 students of the same school where they were. They are left behind by one grade level due to their inability to adjust.

Compared to the mainstream public and private elementary school students, the Aeta students were only ranked 5th. They were not even comparable with the grade three students of the private urban school. Interesting are the first three groups identified by the Scheffe test. They were the Grade 4, 5, and 6 levels of the private urban school whose grade 4 students were better than their grade 5 students. On the other hand, the students of the public rural schools were categorically behind the students of the private urban schools. These so indicate that most students in the subject rural school had great difficulty in mathematics. However, though the performance of the whole school population was poor, the performance of the Aeta students was even more depressing to realize.

C. The Causes of Students' Weaknesses and Strengths

The causes of students' weaknesses were identified qualitatively thru the observation of Dungo [2] and Garcia [4]. These were validated by their interviews with the teachers and the students.

The Apu Palanguwan Cultural Center (APC) is an institution that caters only the indigenous tribe of Bendum. The concentration and focus on the same tribe gave them a better picture in understanding the culture of the students and their learning difficulties. Having this knowledge, teachers were able to identify the students' needs and how to address them. The APC Grade 6 students were far better in terms of performance compared to the Aetas who were mainstreamed with regular classes. This speaks of the reason why the Aeta students were far behind the regular students, who, compared with the students of a private urban elementary school, were also not good. This also identifies a problem not only for the Aetas but for the whole rural school students.

The goal of mathematics education in the APC is to provide indigenous students with mathematics content and approaches that would enable them to successfully master modern mathematics. However, no matter how desirous the students were in making this effort a reality, there were some problems that need to be addressed according to Dungo [2].

Students in indigenous societies around the world have, for the most part, demonstrated a distinct lack of enthusiasm for the experience of schooling in its conventional form - an

aversion that is most often attributable to an alien school culture [5].

The deprivation of the students in terms of amenities in life makes them less performing. Their poverty would not afford them the luxury of gaining ideas from books, television, and other media. The inadequate food at home and the lack of support system from the family and the home make students struggle for two things: intellectual development and subsistence. It is a question of priority. Which is more important to them, their studies or their subsistence?

V. CONCLUSIONS

Based on the results and findings, the following conclusions are deduced.

- The Grade 6 students of APC were of equal performance in basic mathematical skills with the grades five and six students of a private rural school. Their performance is also comparable to the Grade four students of the regular public elementary school in a rural setting. On the other hand, the Aeta students were one grade level behind their school mates, whose Grade six level was comparable with the grade 3 level of a private rural school in Capas, Tarlac.
- In basic mathematical computation skills, the Grade 6 students were better performing compared to the Aetas who were mainstreamed in a regular rural school. Their average is within the passing rate compared to the Aetas whose general average is below 50%.
- Cultural adjustment and poverty are the main causes for the students' level of performance in mathematics. Cultural incompatibilities seen in the language and materials used for instruction made the lessons hard to understand. On the other hand, the poverty of the students' families made their focus divided between desire to scholastically develop and to struggle for life.

VI. RECOMMENDATIONS

The following recommendations were arrived at based on the conclusions of the study.

- In teaching the indigenous students instructional materials should be localized and adapted to their language. Even the mathematics exercises and drills should be contextually adjusted to the individual cultures of the indigenous students.
- The schools where Indigenous students are mainstreamed should find ways to help the students make up and cope with the performance of regular students by remedial instruction outside the regular class schedules.
- The schools should extend programs that will help the families in the vicinities of the school improve their livelihood and survive economically.

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