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Magindanawn Elementary Pupils' Understanding of Science Concepts

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Abstract: The study was undertaken employing a descriptive analysis and correlative methods of research to four magindanawn dominated elementary schools of Kabacan West District. The findings reported that the performance of the pupils in both tests (Pure English and English with Magindanawn interpretation) was generally very poor. For the English words, only about 46 pupils out of 109 answered correct interpretations to the science words in pure English. Sixty-two pupils (57.41%) got correct answer on "influence" (pure English) and 46 pupils with magindanawn interpretation (44.44%), 57 pupils (52.78%) got correct interpretation for English words "average", and "essential" and 56 pupils (51.85%) got correct answer on "convert" and "charge". On the other hand, only a mean of 58 students (53.7%) got correct answer on "natural spring (55.56%) and "converse" (51.52%). The mean scores of the tests (A_1 and A_2) were 6.06 and 4.44 respectively. The pupils seemed to have performed better in test A_1. There was no significant difference between the pupils mean scores in both tests. There found to be no significant relationship of the various factors affecting scores of pupils in test of science word in English with and without magindanawn interpretation as well as test of science word context. However, Age of the pupils significantly related to Test A_1(Pure English) and Test A_2 (Science word context). Gender is related on both pure English and with magindanawn interpretation but not to test A_2. On the other hand, education of parents is highly related to Test A_2 which implies that parents educational attainment is a great factor that may influence the ability of the pupils to understand English context correctly. Teacher's training was also found to be significantly related to the scores of pupils in Test A_2. The ability of the pupils to understand science word context depend also to the trainings of their teachers.

Keywords: Pure english word, magindanawn interpretation, science context, Kabacan West District.

INTRODUCTION

Language is one of the various media through which every culture expresses its concepts about the environment. It is a vehicle for the expressions of thoughts from which the concepts concerning the environment are formed by the individual. In science teaching, the functions of language can only be effective if common meanings are given to the words encountered during the teaching/learning process and in scientific texts. This situation can be facilitated if the language of instruction is the first language of the learner [1] and the words used are understood in the context in which they are used[2].

Learning science through a second language may pose a number of problems. Every culture has its unique language through which the individual's perceptions of the world are expressed[3]. Therefore words used during instruction in science may have different cultural roots from those of the native language of the learner. In science education, certain words needed to explain certain natural phenomena or to understand some science concepts may or may not be available when a foreign language is the medium of instruction. For example, a study conducted by Yakubu [4] to identify equivalent words in Kusaal language for such concepts as: temperature, energy and speed in parts of Northern Ghana showed that they were non-existent.

The learning of these words without local equivalents proved difficult for the students. In another study carried out by Mori and Kitagawa [1] to find out the role of native language on children's formation of the concept of speed by Japanese and Thai children, it was found that the Thai language accelerated the Thai children's acquisition of the concept of speed while the Japanese language impeded the Japanese children's development of the concept. Therefore the native language of the child can facilitate or hinder the child's understanding of science (concept) words. Collison [5] carried out a study to compare the native language and English language as medium of instruction for concept acquisition among Ghanaian children. The study

revealed consistently that where English was the language of instruction, majority of the experimental subjects were not able to exercise their conceptual potential. The native languages proved more fruitful for enhancing the class interaction of the children.

Tobin and Mcrobbie[6] investigated the significance of limited English proficiency (LEP) to performance in science of Chinese-Australian students. The investigation revealed that despite the students' effort to learn chemistry, difficulties in speaking and writing English were factors that limited their performance. The study also supported the assertion that learning chemistry could be facilitated when LEP students were provided with opportunities to fully employ their native language tools. Also Tobin showed that science achievement of limited English proficiency (LEP) students in grade 10 was statistically lower than that of students who were proficient in English in all the content areas assessed. Benz [7] followed eleven non-English speaking students as they adapted to community college content courses taught in English. The non-English students were examined in three areas including requirement for content classes. The study revealed that the students drew on their native language education as they coped with the demands of the content classes. The native language is therefore an important factor which cannot be ignored in science concept formation.

For students whose native language is not English, the process of literacy development in English can be particularly difficult if they did not bring to the learning process a foundation of literacy in their own language. The development of literacy in student's native language provides the social, cognitive, and linguistic foundation for academic success[8]. It is through their first languages and home cultures, that students create frameworks for new understanding. Learning the language of science starts prior to formal education.

Communication skills start before academic skills. Thus family communication appears to be of importance in developing the academic skills of the learner and the family's patterns can affect the development of a child's science literacy skills as well.

In the Philippines, as a national policy for K-12 educational system, the native language is used as the medium of instruction during the first year of primary schooling; thereafter, English language is used as the medium of instruction. The effect of this English language, on the acquisition of science concepts has not been investigated. It is therefore desirable to study the influence of local dialect on grade VI students of Kabacan West Districts' understanding to science concepts words when used out of and in science context and whether the native language of the students has any influence on the interpretation she/he gives to the words out of, and, in science context.

CONCEPTUAL FRAMEWORK OF THE STUDY

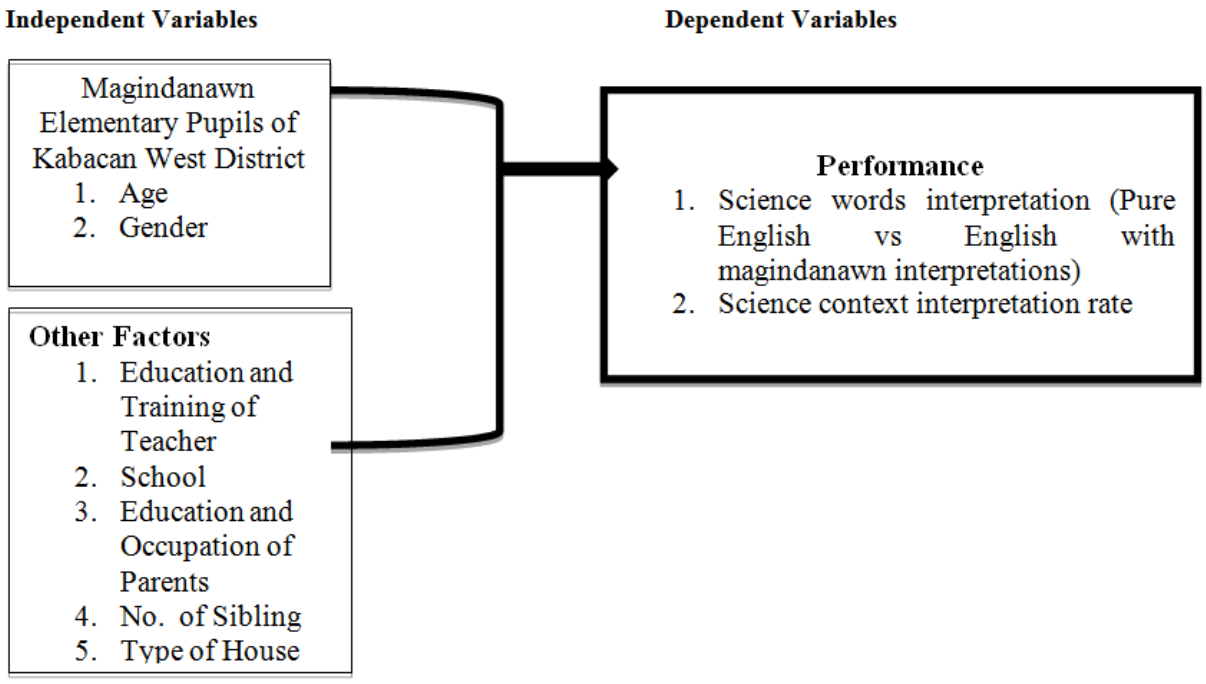

Fig-1: Diagram showing the conceptual framework of the study

METHODOLOGY

Research Design

Descriptive correlational methods were employed in this study to determine the relationship of the science word interpretations with science context interpretations of grade VI pupils of selected elementary schools of Kabacan West District as influence by school, gender and age of pupils.

Respondent of the Study

The study involves 109 pupils (49 males and 60 females) from four elementary schools of Kabacan West District namely: Malabuaya Elementary School (23), Nangaan Elementary School (24), Simone Elementary School (19) and Kayaga Elementary School (43). The average age of the pupils were 11.62 years old. The principal native languages spoken in the area are magindanawn.

Farming and fishing activities are the predominant occupation of the adult population. Those in the nearby towns are either government employees or small scale business men and women. Majority of the population is illiterate. Though the schools were poorly staffed, the schools were worse off than the schools in the nearby towns. In most cases there were only 3 teachers handling all subjects in the school. Some of the schools had more than a class in a form. The contact hours between the English language teachers and the students were quite reduced because of the poor staffing of the schools. Moreover majority of the teachers handling the English language classes were teachers not specialized in English.

The highest qualification of the teachersweres Bachelor's Degree in Education. Those handling the science courses did general courses in Agricultural science or General Science. Some of the schools investigated had no qualified Science and English Language teachers. It was common to find untrained BS degree holders teaching English language classes.

Sampling Procedure

Four schools dominated by magindanawn pupils in Kabacan West District were chosen as school samples. Complete enumeration of 109 magindanawn grade VI students were employed for the pupils' respondents as follows:

Kayaga Elementary School – 43 pupils
Nangaan Elementary School - 24 pupils
Simone Elementary School - 19 pupils
Malabuaya Elementary School – 23 pupils

Research Instrument

The instrument used in the study consists of demographic questionnaires and two multiple choice tests (Test A_1, Test A_2) involving twenty-five science words with and without context. The words are encountered by the pupils in their daily use of English language, and are used in radio and television broadcasts. They are also found in the textbooks used at the grade levels of the elementary school.

Test A_1, which was administered first, required the pupils to select from four options numbered A-D the word similar in meaning to the word being tested which was not used in any specific context.

E.g. *Rate* can mean

A. Shape
B. Size
C. Speed
D. Distance

Test A_2, which was administered immediately after test A_1, involved the same words but each was used in specific science context. For each item, the subjects were also expected to choose from four options numbered A-D the one that best explained the word tested in the science context.

E.g. The experiment is designed to study the *rate* of evaporation. This means it is designed to study:

A. What happened during evaporation?
B. how quickly evaporation takes place
C. what is left after evaporation
D. why evaporation takes place

RESULTS AND DISCUSSION

Frequency and Percentage of Correct Responses among Pupils

The frequency distribution of the puplis' scores on the interpretation of science words in pure english (test A_1) and with magindanawn interpretation (test A_2) are presented in Table 1.

Table-1:Grade VI students' number and percentage of correct responses to test items

Science Concept Word Tested	Correct Response on Pure English Word			Correct response with Magindanawn Interpretation		
	No. of Students		%	No. of Students		%
	Male (N=49)	Female (60)		Male (N=49)	Female (60)	
Average	29	28	52.78	19	16	32.40
Disperse	20	17	34.26	4	11	13.88
Displace	29	25	50.00	7	13	18.51
Oust	31	20	47.22	21	21	38.88
Converse	29	21	46.30	26	30	51.85
Contaminate	26	26	48.15	24	21	41.66
Effect	27	26	49.07	28	23	47.22
Influence	34	28	57.41	21	27	44.44
Impression	26	17	39.81	26	8	31.48
Essential	29	28	52.78	19	13	29.63
Fundamental	27	24	47.22	24	19	39.81
Convert	34	21	50.93	18	18	33.33
Switch	18	25	39.81	23	25	44.44
Win over	28	25	49.07	27	17	40.74
Rate	34	19	49.07	15	25	37.08
Degree	23	11	31.48	16	17	30.55
Charge	34	22	51.85	5	23	25.92
Source	19	13	29.53	22	8	27.77
Informant	21	15	33.33	21	7	25.92
Resource	27	15	38.89	26	25	47.22
Natural spring	22	13	32.41	27	33	55.55
Prepare	26	18	40.74	25	28	49.07
Function	27	3	27.78	7	25	29.63
Proportion	29	15	40.74	21	30	44.22
Dehydrate	12	10	20.37	20	33	49.07
Mean	**26.44**	**19.4**		**19.68**	**20.64**	

The performance of the students in both tests was generally very poor. For the English words, only about 46 students out of 109 respondents gave correct interpretations to the science words in pure english. Sixty-two (57.41%) got correct answer on "influence" (pure English) and 46 with magindanawn interpretation (44.44%), 57 students (52.78%) got correct interpretation for English words "average", and "essential" and 56 (51.85%) got correct answer on "convert" and "charge".

On the other hand, only a mean of 58 students (53.7%) correct answer on "natural spring (55.56%) and "converse" (51.52%).

The mean scores of the tests (A_1 and A_2) were 6.06 and 4.44 respectively. The students seemed to have performed better in test A_1. Despite the general poor performance on the tests, there was an insignificant difference ($t = 1.542$, $p > 0.05$) between the student mean scores in test A_1 and A_2 (Table 2).

Table-2:Mean difference of test scores in science word (pure English) and with magindanawn interpretation

Paired Variable	Mean	SD	SE	t	Prob.
English-Magindanawn	8.75	30.75	5.67	1.542	0.135

Despite no significant difference of test score in science word (Pure English) and with magindanawn interpretation, it was found out that the correlation of the two variable is very high ($R^2 = 0.997$) which is qualitatively interpreted as very high linear relationship. This is interpreted as high scores in English word test will mean for the increase of pupils score in English with magindanawn interpretation. Hence, the null hypothesis which stated that there s no significant relationship of test score in pure English with that of English with magindanawn interpretation is rejected.

The students performed better in test A_1 (mean = 6.06) than in test A_2 (mean = 4.44). The general trend

was an increase in the frequency scores for corresponding test items in test A_1 except "spring" (Table 1). The lower test scores in test A_2 may be due to the misinterpretation based nature of test A_2 where the words were not familiar in magindanawn. The context might have made the meanings of the words unclearer except those indicated above.

The poor performance of the students in test A_2 may be due to a number of factors such as poor magindanawn translation, the general poor standard in English language among magindanawn pupils at the basic school level. Inefficient interpretation of science words in English with magindanawn and poor word translation may hinder science concept formation since literacy plays an important role in determining students' academic performance[8].

The percentage scores of the students on some of the science words without magindanawn equivalents were higher than those of some of the science concept words in Table 1 with magindanawn equivalents. The students' performance on some of these words in both tests is given below:

Average: 52.78% in test A_1 and 32.1% in test A_2
Influence: 57.41% in test A_1 and 44.44% in test A_2
Essential: 52.78% in test A_1 and 29.63% in test A_2
Convert: 50.93% in test A_1 and 33.33% in test A_2
Charge: 51.85% in test A_1 and 25.93% in test A_2
Converse: 46.30% in test A_1 and 51.52% in test A_2
Natural Spring: 32.41% in test A_1 and 55.56% in test A_2

Perhaps the better performance on such words may be due to the fact that the meanings of these words are not clear to the cultural experiences of the students related to some of the local equivalent words. This seems to differ with some findings reported in the literature[9,1, 4, 10] that non-equivalence between science concepts or science words in textbooks and native language of students can hinder the understanding of such words and hence affect their acquisition of science concepts. Therefore factors other than the presence or absence of native language of the learner, where instructions is in a foreign language, may affect the learner's understanding of science English words.

These factors include dissimilarity between the English meaning of the science word and its magindanawn language equivalent, and the interference of the cultural context meaning of the word. For example the equivalent word for source is 'nabpunan'" which means 'normal size', for 'disperse' is 'tagayak'. 'Tagayak' has two English meanings depending on the context in which it is used and these are 'fluctuate' and 'scatter'. The low score of the students obtained in items involving disperse and absorb may be attributed to this lack of congruence between their English meanings and those of their corresponding native equivalents. For example most of the students interpreted average as 'normasize"l instead of 'rgular" in both tests.

Fifty- percent of the students correctly interpreted 'desplace' in pure english but this figure dropped to 18.5% when given a magindanawn interpretation. Table 1. The correct option for displacet in test A_2 is 'relocate'. The drastic drop in the students' correct responses to the word in test A_2 may be attributed to their failure.

Relationship of Personal and other factors with test scores of pupils

Table 3 presents the relationship of the various factors affecting scores of pupils in test of science word in English with and without magindanawn interpretation as well as test of science word context.

Age of the pupils significantly related to Test A(Pure English) and Test B (Science word context). Gender is related on both pure English and with magindanawn interpretation but not to test B.

On the other hand, education of parents is highly related to Test B which implies that parents educational attainment is a great factor that may influence the ability of the pupils to understand English context correctly. Teacher training factor is also found to be significantly related to the scores of pupils in Test B. The ability of the pupils to understand science word context depend also to the trainings of their teachers.

Table-3: Relationship of schools with test scores

Factors	**Test A_1**		**Test A_2**
	Eng	Mag	
Age	0.491*	0.009	0.418*
Gender	0.445*	0.704**	-0.280
House Type	-0.032	0.289	0.150
No. of Sibling	0.251	0.411	-0.011
Occupation	-0.011	-0.199	-0.029
Education of Parents	-0.029	0.130	0.861**
Training of Teacher	0.242	0.220	0.403**

Analysis of variance was used to determine significant difference of the different elementary schools on the scores of the magindanawn pupils in the test of science word context (Test B). It was found out that the different schools perform indifferently. No significant differnces had been reported by the ANOVA. Hence, the null hypothesis is rejected.

Table-4: ANOVA of the mean difference of test scores among selected elementary schools of Kabacan West District

		Sum of Squares	df	Mean Square	F	Sig.
Kayaga	Between Groups	693.993	18	38.555	1.724	.258
	Within Groups	134.167	6	22.361		
	Total	828.160	24			
Malabuaya	Between Groups	814.833	18	45.269	.521	.867
	Within Groups	521.167	6	86.861		
	Total	1336.000	24			
Nangaan	Between Groups	569.893	18	31.661	.628	.794
	Within Groups	302.667	6	50.444		
	Total	872.560	24			
Semuni	Between Groups	1164.873	18	64.715	3.876	.051
	Within Groups	100.167	6	16.694		
	Total	1265.040	24			

The test of mean difference of gender on English word with magindanawn interpretation reveals that female comes out to have significant effect on the test score. In Table 1, female pupils perform lower as compared to males. The findings implies that the test score of pupils is dependent on their gender affiliation. Females significantly perform less than males as indicated in Table 1 and supported by the ANOVA in table 5 below.

Table 5: Difference of Gender on English word interpretation with and without magindanawn interpretation

Model	β	Std. Error	t	Prob
Constant	-1.622	10.907	11.149	0.083
Male	0.570	0.222	0.571	0.217
Female	0.470	0.217	-1.164*	0.042

R^2 = 0.473
F = 9.873
Probability = 0.001

It can be depicted in Table 6 that the combined effect of the independent factors on interpreting science word context is significant P<0.00. Its contribution to the test score is accounted to 38.1%. More than 62% is due to other factors that are not included in the analysis.

Education of parents and training of teachers come out to be the predictors of the test score. This simply means that the score of pupils in science word context test is dependent on the education of parents and trainings of teachers in English.

Table-6: **Influence of respondent's profile on interpreting science word in 630 English**

Model	β	Std. Error	t	Prob
Constant	48.657	17.376	2.800	0.002
Gender	2.754	3.856	0.714	0.485
Age	0.023	2.072	0.011	0.991
House type	-0.199	3.889	-0.051	0.960
No. of sibling	0.270	2.540	0.106	0.916
Education of Parents	1.041	1.935	0.538	0.598
Occupation of Parents	-13.294	0.846	2.942**	0.003
Teacher Training	1.223	0.276	2.044*	0.049

R^2 = 0.381
F = 3.742
Probability = 0.002

CONCLUSION AND RECOMMENDATIONS

The poor performance of magindanawn students on science concept words in the tests may be due to poor standard of English language among basic school students. Similar studies [11,12] on the level of proficiency in English language of Ghanaian pupils at basic schools (Primary and JSS), reported that poor vocabulary and poor word association affected their proficiency in English language. A number of factors may account for this. The contact time of the students with English language is limited to the classroom. Very little English language is spoken at [13].

Also there is a limited variety of English readers in the schools. In recent past teachers used to copy passages from readers on the chalkboard for the pupils to read. This affected the reading habits of the students with consequential effects on word vocabulary and comprehension of text. Despite the Government's effort to ensure that the ratio of English readers and textbooks on other subjects to students is one to one ratio is still two to one and in some cases it is three to one.

Also oral spelling of words and written dictation of English words are no longer emphasized in the schools. This may lead to poor vocabulary which affect the meaning students give to science words encountered in science text and in everyday use of the English language. Science and language teachers should engage students in oral word spelling, dictation and word association exercises to improve the students 'vocabulary. The word connections from the exercises will improve their comprehension of science words when encountered in science texts.

The ability to understand and explain in clear language the meanings of fundamental science concepts is central to science literacy. The inability to interpret correctly science concept words encountered in science textbooks and in every day use of the English language hinders students' understanding of science concepts and impedes science instruction.

Inadequate supply of recommended texts and other reading materials are common features in most developing countries where English is a second language. Therefore supply of adequate texts and other reading materials that could enhance students' conceptualization of science words should be given priority. In countries where the medium of instruction for the first three years of schooling is in the local language, the headteachers should enforce the use of English language as medium of communication within the school premises to increase the contact time of students with the language.

Studies by Mori et al[1]and Yakubu [4] reported that where native equivalents to science words exist the students are able to understand the latter. This was not so in this study. Their studies were conducted in elementary schools where the native language was the official language of communication for the greater part of the programme. Though the native language is officially recommended for the first three years of elementary school instruction in most cases, it is used for the greater part of the elementary school because of the poor acquisition of English words by the pupils. They are therefore amenable to native words than English ones. Hence their at the Secondary School(SS)level the recommended medium of instruction is English language, perhaps this practice is responsible for the SS better performance in science words without native language equivalents. Also some of these words are encountered frequently by students in everyday use of English language and in science text. For example, the word "essential" in essential commodities", is household terms in Philippines and for 'average', Students were all concern with their average grade or general point average in there various subjects.

The poor performance on science words with native equivalents could be attributed to the early switch from the native language of the students to English language as medium of instruction in Ghanaian schools. The switch is effected after the first three years of basic school education. Collison[5] compared the native language(s) (of Ghanaian pupils) and English language to find out which of these was a better medium of instruction. The native languages were better media for instruction of pupils at the basic level. He recommended a long period of instruction of pupils in their native languages at the basic school for better conceptual development because high linguistic and cognitive development in the child can lead to transfer of linguistic skills to a second language[12].

The findings of this study suggest the use of the native language along side English language in science instruction for proper language development and effective transfer to the second language after the elementary. Also when students begin to use the second language exclusively for learning then the native language should be discontinued for any reason whatsoever to avoid confusion.

Philippines, like other countries where English language is studied as a second language, the true position is that English might really be the third or fourth language. In most cases it is the language of the majority tribe that becomes the official local language in schools (Philippines, Ghana, Nigeria, Sierra Leone among other countries). For example in this study the major native languages spoken are magindanawn, illonggo and bisaya but English is the official language used in schools. It means that those who speak illongo and bisaya have first to learn tagalog as second language and English as a 3rd language. The impact of

this practice on students' performance in science needs to be investigated.

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