EARLY NUMERACY LEVEL OF YEAR 1 PRIMARY SCHOOL PUPILS IN A FELDA AREA IN NEGERI SEMBILAN

Sharifah Norul Akmar Binti Syed Zamri, Ph.D
Department of Mathematics and Science Education
Faculty of Education
University of Malaya

Numeracy is at the forefront of contemporary educational development in several parts of the world; however it is a relatively new concept in Malaysia. The focus of this research is early numeracy which refers to early mathematical competence or underlying foundations to be mastered by children before they begin learning the formal mathematics in Year 1. Despite the lack of consensus and clarity regarding the meaning of early numeracy, van de Rijt (1996) as reported by Torbeyns et al. (2002) identified eight aspects considered crucial for developing early numeracy. Her 'synthetic model', incorporated both Piagetian perspectives and counting skills. Specifically, the eight aspects of early numeracy include concepts of comparison, classification, one-to-one correspondence, seriation, use of number words, structured counting, resultative counting and general understanding of number words.

Objectives

The purpose of this study was to investigate the level of early numeracy of Year 1 pupils in 19 primary schools in a FELDA area in Malaysia. FELDA refers to The Federal Land Development Authority, a Malaysian agency handling the resettlement of rural poor into newly developed areas. One of the aims is to alleviate rural poverty through resettlement by opening smallholder farms and planting of cash crops.

Research Questions

The study was done to answer the following research questions:

1. What is the numeracy level of the Year 1 primary school pupils in a selected FELDA area?
2. What is the extent to which the eight components of early numeracy were mastered by the Year 1 students?

Methodology

Participants

The participants were 357 Year 1 pupils from 19 primary schools in the FELDA area. On the average 19 pupils were selected from each school. All sample subjects were chosen at random by Year 1 mathematics teachers in each school. The samples were categorized according to gender and age group in year and month: 6.01-6.06 (43.7%), 6.07-6.12 (50.4%) and 7.01-7.06 (5.9%). Among the participants, 50.4% (180) are male while 49.6% (177) are female.

Instrument

The Early Numeracy Test (ENT) (van Luit, van de Rijt, & Pennings, 1994) was used to measure the level of early mathematical competence of the pupils. Research findings showed that the ENT is a useful tool for international comparison (van de Rijt et al., 2003). The test comprises eight components of early numeracy: concepts of comparison, classification, one-to-one correspondence, seriation, the use of number words, structured counting, resultative counting and general understanding of numbers. The ENT Form A used in this study consisted of five items for

each component with a total of 40 items. Each item is scored dichotomously on correctness with a maximum score of 40. The total score on the test is transformed into a competence score (linear transformation), with values ranging from 0 to 100. This competence score indicates the pupils' level of mastery of early numeracy. The higher the competence score of the child, the better he or she masters the early numerical skills according to the following level: A (good to very good), B (ample to good), C (moderate to ample), D (weak to moderate), E (very weak to weak).

Procedure

Trained Year 1 mathematics teachers administered the test to individual pupils in their own schools. Data were collected through structured face to face interviews lasting about 20-30 minutes per pupil. During assessment the test administrator also wrote down some qualitative observations about the strategies the child uses to solve the test items. However the qualitative observation is not discussed in this paper.

Findings

1. Reliability measures

The internal consistency of Form A of the ENT as estimated by Cronbach's alpha was .87 and can be considered satisfactory.

2. Analysis of pupils' score

Female pupils scored higher for the first two age groups but male pupils scored better for the third age group with a mean of 76.6. The overall results show that those in the third age group scored better that the first two (mean =75.48)

Table 1
Mean score and standard deviation according to age group

Age Group	Overall		Male		Female		Level	Level Overall
	Mean	SD	Mean	SD	Mean	SD		Mean
6.01 -6.06	72.45	15.39	71.37	15.27	73.61	15.55	B	
6.07 – 6.12	72.61	15.32	71.63	16.58	73.54	14.03	C	72.71 (C)
7.01 – 7.06	75.48	10.40	76.64	12.90	74.20	7.24	C	

The level of competency overall and for each age group is also shown in Table 1. The overall score 72.71 correspond to level C. On the average most pupils has achieved a level which is comparable with the level of around 25% of the pupils in the norm group scoring just below the average. Overall, the pupils are able to answer correctly most of the items in each component except a few resultative counting items. Table 2 confirmed this finding, where only 9% of the participants are unable to answer any of the items for resultative counting correctly. Level B for the age group 6.01-6.06 indicates ample to good performance, comparable with around 25% of the pupils in the norm group scoring just above the average.

3. Analysis according to the eight components of early numeracy

For each of the 40 items in the test, the facility (i.e the proportion of students answering the item correctly) for each component was calculated followed by the mean of the item answered correctly for each component (See Table 2). About 74% of the pupils answered all 5 comparison items correctly followed by, in order, one-to-one correspondence (46.5%), resultative counting (45.7%), general knowledge of numbers (41.2%), classification (40.6%), structured counting (35.3%), using number words (28.0) and seriation (16.5%). On the average pupils answered 4 out of 5 items correctly for *comparison* and *one-to-one correspondence* items while 3 out of 5 items correctly for the other components.

Table 2

Proportions of Pupils Answering the Items Correctly

	Items answered correctly						Mean
	0	1	2	3	4	5	
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	
Comparison	3 (0.8)	2 (0.6)	7 (2.0)	26 (7.3)	56 (15.7)	263 (73.7)	4.57
Classification	1 (0.3)	21 (5.9)	48 (13.4)	68 (19.0)	74 (20.7)	145 (40.6)	3.67
One-to-one correspon-dence	7 (2.0)	9 (2.5)	20 (5.6)	52 (14.6)	103 (28.9)	166 (46.5)	4.05
Seriation	10 (2.8)	33 (9.2)	53 (14.8)	84 (23.5)	118 (33.1)	59 (16.5)	3.24
Using number words	12 (3.4)	32 (9.0)	37 (10.4)	54 (15.1)	122 (34.2)	100 (28.0)	3.52
Structured counting	16 (4.5)	26 (7.3)	43 (12.0)	43 (12.0)	108 (28.9)	126 (35.3)	3.59
Resultative counting	32 (9.0)	28 (7.8)	39 (10.9)	35 (9.8)	60 (16.8)	163 (45.7)	3.55
General knowledge on numbers	10 (2.8)	15 (4.2)	36 (10.1)	49 (13.7)	100 (28.0)	147 (41.2)	3.83

Discussion and Conclusion

The purpose of this study was to investigate the level of early numeracy of Year 1 pupils in 19 primary schools in a FELDA area in Malaysia. Participants in this study comprised 357 Year 1 pupils. Data in this study were collected through face to face individual interviews using the Early Numeracy test (ENT). This study is important because early numeracy is crucial for the learning of basic mathematics skills and for higher level mathematical knowledge. Solid foundations of early numeracy ensure the development of further mathematical knowledge and understanding. It is also interesting to note that previous research findings had shown that most of the students having problems with mathematics at the primary school were already low mathematics achievers in preschool (Dehaene, 1992; Geary, 1994).

Findings show that the average competence score of the pupils in this study is 72.71, corresponding to level C. On the average, most of the pupils in this study have achieved a level comparable with the level of around 25% of the pupils in the norm group scoring just below the average. Findings also show that on the average pupils were able to answer at least 3 out of 5 items in each component correctly; however, items on resultative counting seem to be rather difficult for the students. These findings will assist mathematics teachers in taking specific actions to ease the transition from early to basic mathematics instruction in Year 1. Teachers need to design remedial lessons to assist the pupils in acquiring mastery of early numeracy skills. Further investigations are strongly recommended to examine early intervention, remedial instruction and continuing assistance for pupils having low competency in early numeracy. Since the analyses in this preliminary study were conducted using averages, future research should be directed at a more detailed focus on each individual pupil to determine the development of early numeracy.

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