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Designing a Classification Toolkit for Mathematically-Deficient 4th Grade Students: A Case Study in Vietnam

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Abstract: The theory of educating slow-learning students has pointed out that, the first and most important step in this study is to identify and categorize the slow learners. In order for this study to be carried out effectively, a feasible and scientific procedure which complies the teachers' ability with educational environment in different schools is highly required (Brennan, W. Kyran (1974)), (Reddy and Ramar (2006)), (Vu, Q. Chung, Dao, T. Lai, Do, T. Dat, Tran, N. Lan, Nguyen, Q. Hung and Le, N. Son (2005)). The following study will examine some studies of categorizing slow-learning students, as well as suggesting a method of categorizing 4th-grade students who perform poorly in mathematics via the assessing mathematical ability toolkit. To develop the assessing mathematical ability toolkit to categorize slow-learning 4thgrade students, we have focused on some of the following tasks: (i) Determining the criteria for creating sets of exercises, (ii) Assessing the reliability and validity of the toolkit, and (iii) Choosing the conditions for categorizing slow-learning students.

Keywords: categorizing, slow-learning students, mathematics, 4th grade.

1. Introduction

There are various methods of categorizing slow-learning students: Budanui, A. A (1960) believes that low performance in students is conventional in specific circumstances so he divided slow-learning into two types: Absolute slow-

learning and relative slow-learning. Inkovlev, N. M (1962) and other Polish educationists share the same notion. They believe this phenomenon is demonstrated in two different ways: Evidently and potentially. In terms of internal and external factors that motivate the students, Kalnukova, Z (1962), I divided slow-learning students into two groups: those who are academically abandoned and those who are academically deficient. In terms of the duration, extent and level of low performance, Genmont, A. M (1959) suggested 3 groups of underachievers: (1) Completely and seriously deficient in every subject over a long period, (2) Relatively and stably deficient in parts of the curriculum of some complex subjects (Mathematics, Foreign Languages), (3) Temporarily deficient in a random subject, but can be easily resolved (МЕНЧИНСКАЯ Н. А. КАЛМЫКОВАЗ. И. (1964)).

In terms of personality structure, there is another categorization. Some scientists such as Babanskij, Iu. K (1964); Menchinskaja, N. A (1964), Kazanskij, N. G (1964) (МЕНЧИНСКАЯ Н. А. КАЛМЫКОВАЗ. И. (1964)) divided slow-learners based on the premise of combining two basic personality complexes: the first complex is characterized by features of logical thinking (relating to academic levels), the second one is characterized by personal trends including learning attitude and internal point of view. Thus, there are 3 different 2-combinations between the aforementioned complexes and 3 groups of slow-learning students: (1) Poor logical thinking coupled with positive learning attitude and strong point of view, (2) Good logical thinking coupled with negative learning attitude and partial or no point of view, (3) Poor logical thinking coupled with partial to or point of view.

In terms of the students' cognitive ability, World Health Organization (WHO) divides slow-learners into 3 groups based on their IQ scores: (1) The educable mentally retarded (EMR) who have IQ ranging from 50 – 80, (2) the trainable mentally retarded (TMR) who have IQ ranging from 20 – 50, (3) the severely and profoundly handicapped (SPH) who have IQ ranging from 8 – 20 (Brennan, W. K. (1974)), (Curtis, K., & Shaver, J.P. (1980)).

In terms of the mechanism for slow development in functional areas of the brain, Tran, T. T, based on results from Luria 90 test, clinical evaluations, electroencephalogram (EEG) diagnoses, has suggested 3 groups: (1) Slow development in the Frontal, Parietal and Temporal lobes in both cerebral hemispheres, (2) slow development in the Occipital lobes in both cerebral hemispheres, (3) slow development in the left Temporal lobe (Tran, T. T. (1997)).

Based on indications of cognitive limitations, psychologists have suggested the following categories: (1) Those who have poor memory, (2) those who have attention deficit disorder, (3) those who have intellectual disabilities, (4) those who have linguistic disabilities. For mathematically-deficient students in primary school, we can categorize them on the basis of the curriculum contents: slow learners in arithmetic, slow learners in geometry, slow learners in problem-solving, slow learners in statistics. In terms of levels of knowledge acquisition (Reddy and Ramar (2006)),there are: (1) slow learners who are lacking mathematical concepts or unable to memorize the principles, theorems or formulae, (2) slow learners who do not understand or remember the nature of the problems, (3) slow learners who are unable to apply mathematical knowledge to solving problems (Vu, Q. C., Dao, T. L., Do, T. D., Tran, N. L,

Nguyen, H. Q., & Le, N. S. (2005)).
Therefore, categorizing slow-learners is crucial and has been an interesting subject of study for many authors. These studies, however, only approached this matter from diagnostic, neuropsychological and educational-psychological aspects. With these categorizations, teachers will come up against a great many difficulties in identifying slow learners via traditional methods. In reality, in order to effectively help low-performing students, teachers need a categorizing toolkit in the form of exercise sets so as to understand the students' level of mathematical knowledge acquisition, they can pinpoint the students' difficulties, mistakes and gaps in knowledge (Nguyen, V. C., Le, T. N., & Phan, T. Q., (2002)). Those are the points on which we have focused and aimed to resolve in our research. In order to develop such a toolkit, we have carried out the following tasks: (i) Determining the criteria for creating sets of exercises, (ii) Assessing the reliability and validity of the toolkit, and (iii) Choosing the conditions for categorizing slow-learning students. Here we have chosen 4thgrade students to be our research subjects and the aim of this toolkit is to categorize mathematically-deficient 4thgrade students. The statistics used in this research are from some primary schools in Thai Nguyen and Phu Tho provinces in Vietnam.

2. Content

2.1. The criteria for developing the toolkit

Based on the mandatory standards of 4th grade mathematics and the minimum standards of elementary mathematics (Do, D. H., Do, T. D., Dao, T. L., & Do, T. H (2015)), we have built an assessing toolkit in the form of an exercise system aiming to test math proficiency of 4thgrade students, through which we can identify and categorize mathematically-deficient 4thgrade students. In order to meet the requirements for elementary mathematics in general, the students must fully understand the following areas and these can also be regarded as the criteria for evaluating math proficiency of 4thgrade students:
1- Recognizing and understanding the meaning of numbers: Capable of counting, analyzing the formation and comparing between different numbers
2- Arranging the arithmetic algorithm and calculating: Capable of computing four basic arithmetic operations
3- Geometry: Capable of identifying basic shapes, properties of shapes. Know the formulae for calculating the circumference, diameter and area of shapes
4- Units of measurement: Understand and memorize units of measurement table, capable of converting between metric units
5- Problem solving: Capable of solving practical mathematical problems
Therefore, the exercise system must consist of all 5 above-mentioned areas. Meanwhile, in each area, the system must be able to assess which stage in the development process the contemporary knowledge of the student is at. In other words, which grade is the student's understanding of each mathematical area equivalent to? The system should be also able to identify which problems and shortcomings the children are experiencing in each mathematical area.

2.2. Introduction of the toolkit

From the listed criteria and skill requirements in each mathematical area from 1st grade to 4th grade, we have constructed a toolkit assessing math proficiency of 4thgrade students in which the 5 listed areas correspond to 5 domains. In each

domain, the exercises are designed in chronological order starting from the beginning of the knowledge acquisition process up to the contemporary period (4th grade). The level of the exercises the students manage to complete will reflect their level of knowledge acquisition in terms of scores.

Content 1: Assessing the ability to recognize numbers and the meaning of numbers

Type 1: Read and write numbers: two-digit numbers (1st grade); three-digit numbers (2nd grade); five-digit numbers (3rd grade); seven-digit numbers (4th grade).

Type 2: Compare and arrange numbers: Find the largest number in a sequence of 3-digit numbers (2nd grade); Continue a sequence of 5-digit numbers (3rd grade); Identify fractions which are larger than 1 (4th grade).

The exercise system corresponding "Content 1" is called "Scale A", which is suggested as below:

A. UNDERSTANDING NUMBERS AND MEANING OF NUMERS

A1. READ AND WRITE NUMBERS

No.	**Numericals**	**Written number**	**Correct (✓)**
	10 356 217	***Ten million three hundred and fifty-six thousand two hundred and seventeen***	
1	……	Twenty million four hundred and sixty-three thousand two hundred and six	*1pt*
2	67 246	..…… ……	*1pt*
3	……..	One million two hundred and thirty-four	*1pt*
4	222	.....…… …… ……	*1pt*
5	……	Ninety nine	*1pt*
6	$\frac{5}{7}$	…….	*1pt*
7	…….	Eighteen twenty-fifths	*1pt*

Total A1: …../**7 points**

A2. COMPARING AND ARRANGING NUMBERS

No.	**Exercise**	**Correct (✓)**
8	Find the largest number among 395; 695; 375	1pt
9	Fill in the blanks: 18 301;18 302; .....; .....; .....;18 306; .....;	1pt
10	Circle the fractions which are larger than 1: $\frac{5}{7}$; $\frac{3}{2}$; $\frac{12}{15}$; $\frac{13}{11}$	1pt

Total A2:……/**3 points**

Total Scale A= A1+A2: ……./**10 points**

Common mistakes: ……...

Content 2: Assessing the ability to arrange the arithmetic algorithm and calculate

Type 1: Addition: No-carrying addition (1st grade); one-carrying addition (2nd grade); 2-carrying addition (3rd grade); more-than-2-carrying addition, adding fractions with the same and different denominator (4th grade)

Type 2: Subtraction: No-carrying subtraction (1st grade); one-carrying subtraction (2nd grade); 2-carrying subtraction (3rd grade); more-than-2-carrying subtraction, subtracting fractions with the same and different denominator (4th grade)

Type 3: Multiplication: Multiplication table (2nd grade); one-digit multiplication (2nd and 3rd grade); 2-digit and 3-digit multiplication, fraction multiplication (3rd and 4th grade)

Type 4: Division: Division table (2nd grade); one-digit division (2nd and 3rd grade); 2-digit and 3-digit division, fraction division (3rd and 4th grade)

The exercise system corresponding to "Content 2" is called "Scale B", which is suggested as below:

B. USING THE ARITHMETIC ALGORITHMS TO CALCULATE

B1. ADDTION SKILL

No.	**Exercises**		**Correct** (✓)
	Calculate	**Answer**	
11	23 + 14		1pt
12	239 + 517		1pt
13	356 + 276		1pt
14	47865 + 78537		2pts
15	$\frac{3}{5}+\frac{2}{5}$		1pt
16	$\frac{5}{4}+\frac{2}{3}$		1pt

Total B1: ……/ **7 points**

B2. SUBTRACTION SKILL

No.	**Exercises**		**Correct** (✓)
	Calculate	**Answer**	
17	56 – 13		1pt
18	451 – 23		1pt
19	534 – 265		1pt
20	123456 – 10678		2pts
21			1pt

	$\frac{5}{7}-\frac{2}{7}$		
22	$\frac{5}{3}-\frac{2}{4}$		1pt

Total B2: ……/ **7 points**

B3. MULTIPLICATION SKILL

No.	**Exercises**		**Correct** (✓)
	Calculate	**Answer**	
23	3 x 6 = 4 x 8 =		2pts
24	12 x 4 =		2pts
25	23 x 12 =		2pts
26	1456 x 123 =		2pts
27	$\frac{5}{3}\times\frac{2}{7}$		2pts

Total B3: ……/ **10 points**

B4. DIVISION SKILL

No.	**Exercises**		**Correct** (✓)
	Calculate	**Answer**	
28	6 : 2 = 8 : 4 =		2pts
29	84 : 4 =		2pts
30	276 : 12 =		2pts
31	4428 : 123		2pts
32	$\frac{2}{3}:\frac{4}{5}$		2pts

Total B4: ……/**10 points**

Total Scale B = B1+B2+B3+B4=……../**34 points**

Common mistakes: …….

Content 3: Assessing geometry skills

Type 1: Match the shapes with the correct names and colors (1st grade)

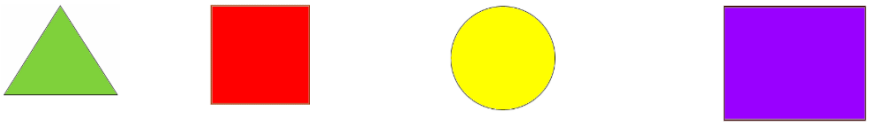
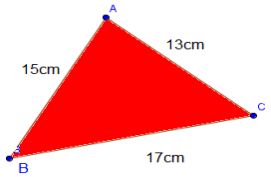
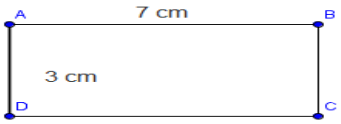
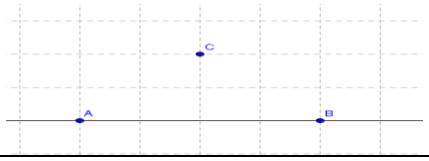
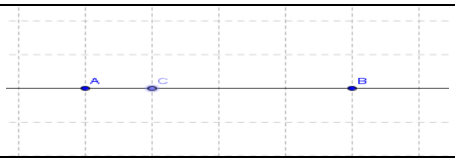
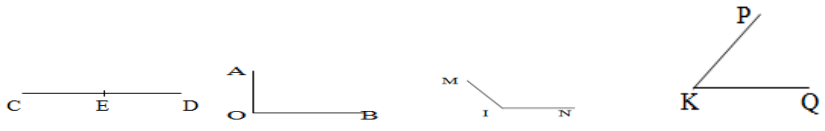
Type 2: Calculate the diameter of a triangle (2nd grade)

Type 3: Calculate the area of a rectangle (3rd grade)

Type 4: Draw parallel and perpendicular lines, identify different types of angles (4th grade)

The exercise system corresponding to "Content 3" is called "Scale C", which is suggested as below:

C. GEOMETRY

No.	Exercises	Correct (✓)
33	Match the shapes with the correct labels: Red Green Purple Yellow  Circle Triangle Rectangle Square	2pts
34	Calculate the diameter of the triangle 	2pts
35	Calculate the area of the rectangle 	2pts
36	Draw a line through point C and parallel to AB 	2pts
37	Draw a line through point C and perpendicular to AB	2pts
		
38	Match the angles with the correct names  Straight angle Right angle Obtuse angle Acute angle	2pts

Total: **……/ 12 points**

Common mistakes: ……

Content 4: Assessing understanding of units of measurement

Types of metric units: weight, time, length, area. In each type we will test understanding of the metric unit chart and unit conversion.

The exercise system corresponding "Content 4" is called "Scale D", which is suggested as below:

D. UNITS OF MEASUREMENT

D1. UNITS OF MASS

No.	**Exercises**	**Correct (✓)**
39	1 centitonne = ……kg	1pt
40	1 quintal = ……centitonne	1pt
41	1 quintal = ……kg	1pt
42	1 tonne = ……quintal	1pt
43	1 tonne = ……kg	1pt
44	1 centitonne 7 kg = ……kg	2pts
45	4 quintal 60 kg = ……kg	2pts

Total D1: ……/**9 points**.

D2. UNITS OF TIME

No.	**Exercises**	**Correct (✓)**
46	1 hour = ……minutes	1pt
47	1 minute = ……..seconds	1pt
48	1 century = ……years	1pt
49	1 minute 8 seconds = ……seconds	2pts
50	$\frac{1}{5}$ century = ……years	2pts

Total D2: ……/**7 points.**

D3. UNITS OF LENGTH

No.	Exercises	Correct (√)
51	1 km = ……..m	1pt
52	1 m = ……dm	1pt
53	1 dm = ……cm	1pt
54	1 cm = ……..mm	1pt
55	1 m = …….cm	1pt
56	1 m = ……mm	1pt
57	2 km 35 m = …….m	2pts
58	3 m 2 cm = ……..cm	2pts

Total D3: ……/**10 points.**

D4. UNITS OF AREA

No.	Exercises	Correct (√)
59	$1m^2$ = ……..dm^2	1pt
60	1 dm^2 = ……cm^2	1pt
61	1 m^2 = ……cm^2	2pts
62	1 km^2 = ……...m^2	2pts
63	10 dm^2 2 cm^2 =……cm^2	2pts
64	9900 cm^2 =…….. dm^2	2pts

Total D4: ……/**10 points.**

Total Scale D= D1+D2+D3+D4 = ……../**36 points**

Common mistakes: …….

Content 5: Assessing the ability to solve practical problems

Type 1: 1-operation problems about addition (1st grade)

Type 2: 1-operation problems about more than/less than (2nd grade)

Type 3: 2-operation problems (3rd grade)

Type 4: 2-to-3-operation problems (4th grade)

The exercise system corresponding to "Content 5" is called "Scale E", which is suggested as below:

E. PROBLEM SOLVING

No.	Exercises		Correct (✓)
	Problem	**Answer**	
65	**Exercise 1**: Minh has 12 pieces of candy; Mai has 23 pieces of candy. How many pieces of candy do Minh and Mai have?	…….. ……..	**2pts**
66	**Exercise 2**: The small jar holds 10 litters of fish sauce; the big jar holds 5 litters more than the small jar. How many litters of fish sauce does the big jar hold?	…….. …….. …….. ……..	**2pts**
67	**Exercise 3:** 42 identical cups are placed into 7 boxes. If there are 4572 cups, how many boxes are they placed into?	…….. …….. ……..	**2pts**
68	**Exercise 4:** There are 45 students in a class, $\frac{3}{4}$ of whom are girls. How many boys and girls are there in the class?	…….. …….. …….. ……..	**2pts**

Total: ……../ **8 points**
Common mistakes: ……..……

2.3. Evaluating the reliability and validity of the toolkit

After being designed, constructed, and consulted by professionals, the toolkit has been completed, comprised of a system of 68 exercises with 5 domains. The points are given in accordance with the scale of each domain with the total sum of 100. We have conducted a small-scale test to determine the reliability and

validity of the scales before conducting a large-scale test. To test the reliability of the toolkit, we have applied the Test-Retest Method to twenty 4th grade students from Tu Xa 2 elementary school in late April, 2015. The students' results from the two tests at a one-week interval have been summed up in the following table:

Table 1: The results of 20 students in two tests

Student (i)	**First test score** x_{i1}	**Second test score** x_{i2}	**Deviation**	**Mean**	**Variance**
1	84	92	-8	88	32
2	100	100	0	100	0
3	88	80	8	84	32
4	56	62	-6	59	18
5	72	76	-4	74	8
6	30	28	2	29	2
7	86	80	6	83	18
8	68	74	-6	71	18
9	88	80	8	84	32
10	100	98	2	99	2
11	90	98	-8	94	32
12	86	82	4	84	8
13	48	46	2	47	2
14	74	76	-2	75	2
15	72	70	2	71	2
16	86	88	-2	87	2
17	54	48	6	51	18
18	100	88	12	94	72

19	56	64	-8	60	32
20	46	42	4	44	8
Mean	**74.2**	**73.6**	$\overline{x_i}$ **=0.6**	$\bar{x}$ **=73.9**	

The coefficient of reliability of the toolkit can be calculated using the following formula

$R = \frac{S_T^2}{S_T^2 + S_E^2}$ in which: R is the coefficient of reliability

S_E^2 is the deviation in the test scores $S_E^2 = \frac{S_1^2 + S_2^2 + ... + S_N^2}{N}$, S_i^2 being the variance of student i , N being the number of participants.

S_T^2 is the actual score reflecting the student's ability. $S_T^2 = \frac{BMS - WMS}{k}$ (with $BMS = \frac{1}{N-1}\sum_{i=1}^{N} 2(\overline{x_i} - \bar{x})^2$ and $WMS = \frac{1}{N}\sum_{i=1}^{N} S_i^2$, $\overline{x_i}$ being the mean score of student i in the two tests; $\bar{x}$ being the mean of the test scores; k being the number of tests conducted on one student, in this case k =2). The results are $S_T^2 = 354.1$; $S_E^2 = 17$, and the coefficient of reliability of the toolkit is R = 0.95.

These results show that the stability of the classification toolkit for mathematically-deficient 4th grade students is rather high. (Nguyen, V. T (2015)).

The validity of the toolkit has been taken into account with two values: internal validity and external validity. The internal validity answers the question: Is the toolkit well-structured? Does it conform to the whole scale? This index is assessed using the coefficient of correlation between different domains, as well as between the domains and the whole scale. The toolkit will have a high internal validity (construct validity) if the smaller scales match up with one another and with the whole scale. The following table illustrates the correlation between the 5 domains, using figures from the test results of the above-mentioned 20 students in the first test:

Table 2: Coefficient of correlation between domains

Coefficient of correlation	**Domain A**	**Domain B**	**Domain C**	**Domain D**	**Domain E**	**The whole scale**
Domain A		0.933	0.788	0.814	0.780	0.912
Domain B			0.886	0.887	0.854	0.982
Domain C				0.791	0.762	0.905
Domain D					0.814	0.948
Domain E						0.882
The whole scale						

The table shows that the coefficient of correlation between each domain and the coefficient of correlation between the domains and the whole scale both have positive value (from 0.762 to 0.982), which means that there is a direct correlation between them. On the other hand, these figures reflect the structural unity of elementary math in Vietnam.

3. Experimenting the classification toolkit for mathematically-deficient 4th grade students

Having confirmed the reliability and validity of the toolkit, we conducted an experiment to identify and classify slow-learning students in 156 students from three schools: Tu Xa 2 Elementary school (65 students), Cao Mai Elementary school (56 students) and Linh Thong Elementary school (36 students). These schools are located in two provinces, Thai Nguyen and Phu Tho, Vietnam. The results are depicted in the following table, using SPSS program

Table 3: Collected figures

N	Valid	156
	Missing	0
Mean		82.29
Median		86.00
Mode		88
Std. Deviation		14.562
Minimum		24
Maximum		100

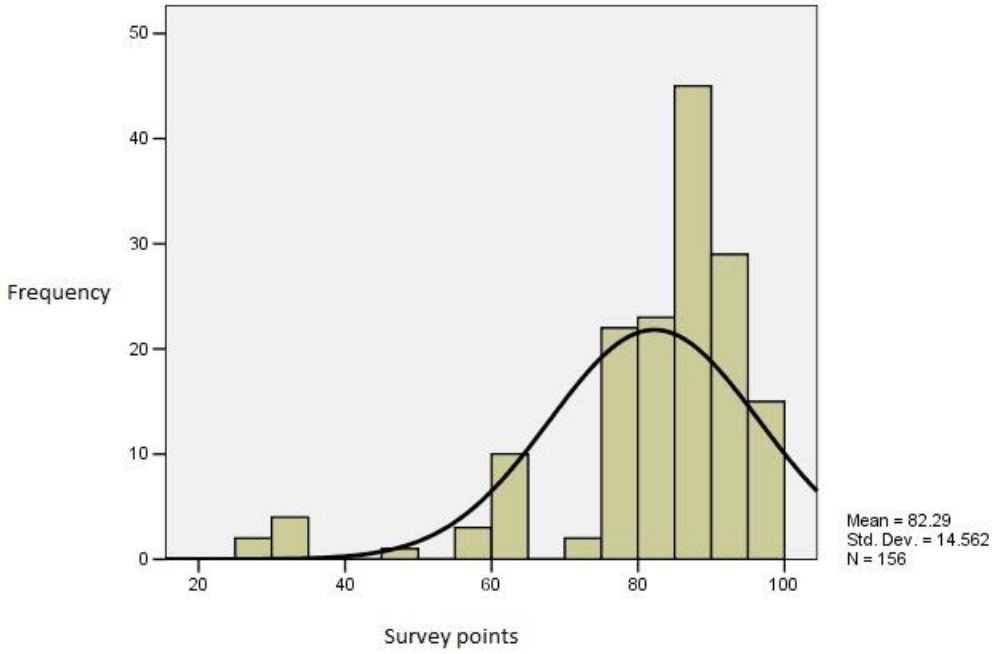
Table 4: Frequency of test scores

Valid	Frequency	Percent	**Valid**	Frequency	Percent
28	1	0.6 %	**81**	1	0.6 %
29	1	0.6 %	**82**	7	4.5 %
30	1	0.6 %	**83**	5	3.2 %
31	1	0.6 %	**84**	10	6.4 %
32	2	1.3 %	**85**	10	6.4 %
46	1	0.6 %	**86**	6	3.8 %
57	1	0.6 %	**87**	10	6.4 %
58	2	1.3 %	**88**	12	7.7 %
60	2	1.3 %	**89**	7	4.5 %
61	2	1.3 %	**90**	6	3.8 %
62	1	0.6 %	**91**	3	1.9 %
63	2	1.3 %	**92**	7	4.5 %
64	3	1.9 %	**93**	4	2.6 %
72	1	0.6 %	**94**	9	5.8 %
74	1	0.6 %	**95**	4	2.6 %
75	1	0.6 %	**96**	3	1.9 %
76	7	4.5 %	**97**	2	1.3 %
77	2	1.3 %	**98**	2	1.3 %

Valid	Frequency	Percent	**Valid**	Frequency	Percent
78	8	5.1 %	**99**	2	1.3 %
79	4	2.6 %	**100**	2	1.3 %

Based on the above table, we have the following graph of distribution of the students' scores:

Graph 1: Distribution of 4th grade students' test scores



The table has reflected the expected characteristics of the toolkit. The overall mean score of the students is over 82.29 out of a maximum of 100. This can be explained by the expectation that this toolkit is designed to identify students who perform poorly in 4th grade math, with the minimum requirements, so that at least 80% (the calculated figure is 81.8%) of the students can complete most of the exercises. Moreover, the arithmetic domain including: number formation and operation already accounts for 44/100 points of the scale; the remaining smaller scales have a certain minimum difficulty to ensure that it is possible for any regular 4th grade student in their second semester to solve them, and can only be a challenge for slow-learning students.

The table of the score distribution of 4th grade students – Graph 1 has fundamentally conformed to the rules of normal distribution – this is an essential element in identifying slow-learning students in 4th grade. The results in Table 4 shows that the mean score of the students is M= 82.29 and the standard deviation is SD = 14.56. The specific results of the mean score and standard deviation of the domains are as follows:

Table 5: The mean score and standard deviation of each domain

Domains	Total score	Domain **A**	Domain **B**	Domain **C**	Domain **D**	Domain **E**
Mean score (M)	M_S= 82.29	M_A = 9.69	M_B= 29.29	M_C = 10.14	M_D = 26.47	M_E= 6.69
Standard deviation (SD)	SD_S =14.56	SD_A =1.11	SD_B =6.01	SD_C =2.57	SD_D =4.34	SD_M=1.60

Therefore, if the total test score of a student is T, we can divide the level of mathematical ability of 4th grade students based on the distribution of the mean score M_S and standard deviation SD_S as follow:

Table 6: Categorization of 4th grade students' mathematical ability

Categories	**Slow learners**		**Non-slow learners**	
	Type 1: Non-definite knowledge in all areas	**Type 2**: Non-definite knowledge in some areas	Basic knowledge of mathematics, meeting requirements in the standard of 4th grade math	Firm basis in math
Boundary	$T < M_S - 2SD_S$	$M_S - 2SD_S \le T < M_S - SD_S$	$M_s - SD_s \le T \le M_s + SD$	$T > M_s + SD$
Corresponding score	T< 53,17	$53,17 \le T < 67,73$	$67,73 \le T < 96,85$	$T \ge 96,85$

Based on the above categorization, Cao Mai elementary school does not have any type 1 slow-learning students. However, if we consider more criteria of domains A and B, and call T_A, T_B the total scores which students gained from domains A and B, with the same categorizing way as above, which means

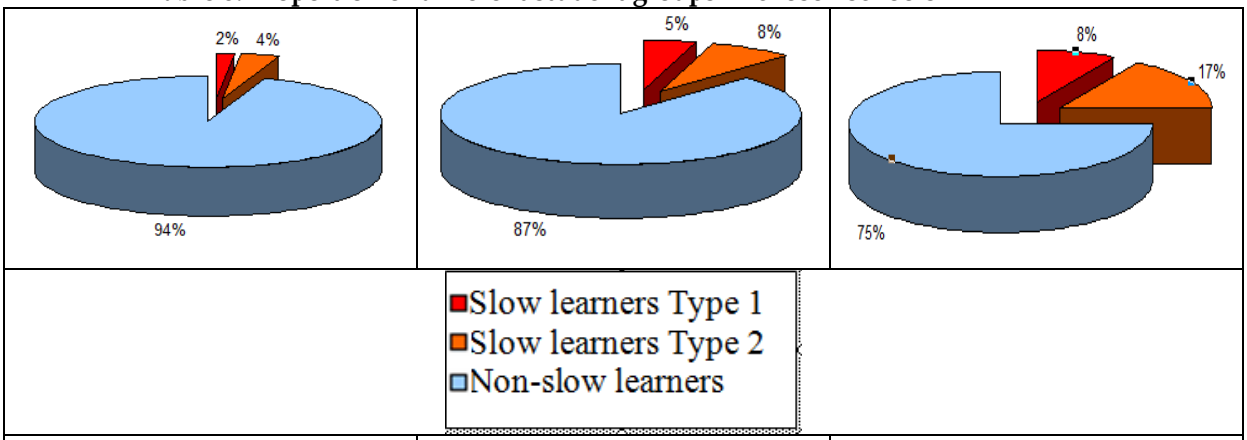
Table 7: Categorizing slow learners according to three criteria

Criteria		Slow learners Type 1	Slow learners Type 2
Total score of the survey	Formula	$T < M_S - 2SD_S$	$M_S - 2SD_S \le T < M_S - SD_S$
	Correspondent score	T < 53,17	$53,17 \le T < 67,73$
Score of domain A	Formula	$T_A < M_A - 2SD_A$	$M_A - 2SD_A \le T_A < M_A - SD_A$
	Correspondent	T_A < 7,47	$7,47 \le T_A < 8,58$

	score		
Score of domain B	Formula	$T_B < M_B - 2SD_B$	$M_B - 2SD_B \le T_B < M_B - SD_B$
	Correspondent score	$T_B < 17,27$	$17,27 \le T_B < 23,28$

So the rate of slow learners between schools is distributed as follows:

Table 8: Proportion of different student groups in chosen schools



Cao Mai primary school	Tu Xa 2 primary school	Linh Thong primary school

And the rate (Slow learners Type 1: Slow learners Type 2: Non-slow learners) in the whole is (4%:8%:88%). This result also corresponds to Newman's error analysis (1977) (Newman, M. A, (1977). Therefore, use the above system of exercises and consider domains using the three criteria: 1. The total score of the survey, 2. Score of domain A, 3. Score of domain A with the determination according to the formula of Table 7, we can determine and categorize students bad at math in 4th grade Mathematics Subject in Vietnam more properly.

Example:

The following table is the test results of a student (Ngo, D. Bang) from Tu Xa 2 elementary school – Lam Thao district – Phu Tho province. This student has the total test score T= 28/100 points, Domain A = 4/10 points, Domain B = 8/34 points. According to the above criteria, this student is a Type 1 slow learner, whose common mistakes have been depicted as follow

Table 9: Analyzing the mistakes in a student's test

Item		Maximum score	Result	Common mistakes
A. Recognizing numbers and their meanings	A1 – Reading and writing numbers	**7**	**3**	Mistakes due to lack of knowledge of the composition of numbers with more than 3 digits
	A2- Comparing and arranging numbers	**3**	**1**	Mistakes due to inability to compare fractions as well as multi-digit numbers
B. Using arithmetic algorithms to calculate	B1-Addition skills	**7**	**4**	Mistakes when adding multi-digit numbers with multiple carryings; not remembering the rule of adding fractions with unlike denominators
	B2- Subtraction skills	**7**	**2**	Mistakes when subtracting with carryings; not remembering the rule of subtracting fractions with unlike denominators
	B3- Multiplication skills	**10**	**1**	Mistakes due to not remembering the multiplication table, not having any multiplication skill
	B4- Division skills	**10**	**1**	Mistakes due to not remembering the division table, not having any division skill
C. Geometry		**12**	**4**	Mistakes due to not remembering the formula for area, the parallelism and perpendicularity of two straight lines, inability to differentiate basic types of angles.
D. Units of measurement	D1- Mass	**9**	**5**	Mistakes due to unfamiliarity to conversion of units of mass
	D2- Time	**7**	**4**	Mistakes due to unfamiliarity to conversion of units of time
	D3- Length	**10**	**1**	Mistakes due to unfamiliarity to conversion of units of length

	D4- Area	**10**	**0**	Mistakes due to unfamiliarity to conversion of units of area
E Problem solving		**8**	**2**	Mistakes right from the process of analyzing, summarizing and determining the problem lead to inability to use the correct algorithm and inability to give appropriate answers
Total		**100**	**28**	

Assessment of the student's mathematical ability: Current mathematical ability is equal to that of a 1st grade student. This student lacks the knowledge right from the understanding of numbers and basic calculations, resulting in consecutive difficulties in acquiring mathematical knowledge.

he solution to the case of student Ngo D. Bang: Math teacher had to tutor Ngo individually to fulfill the lacking knowledge in math for him, cut down general assignments in class, and give him individually suitable duties. Besides, the math teacher had more regular cooperation with the parents in instructing the students to review the lessons at home, as well as asked a group of better students to help him study math.

5. Conclusion

As mentioned in the introduction, there are many methods of identifying slow learners. However, not only does this method of using an exercise system categorize slow learners in terms of their cognitive abilities, but it can also identify the difficulties, mistakes and gaps in the students' knowledge. These are essential for a more effective orientation towards aiding slow learners.

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