



Research Article

**PRIMARY SCHOOL STUDENTS' DIFFICULTIES IN WRITTEN MATH
PROBLEMS FROM THE PERSPECTIVE OF PSYCHOLOGY
– SUGGESTIONS FOR THE NEW GENERAL EDUCATION
CURRICULUM IN VIETNAM**

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ABSTRACT

The article addressed a number of primary school students' difficulties when solving written math problems from the perspective of Psychology. Doing math exercises, especially solving written math problems, plays an important role in the intellectual development of primary students. Operations including writing out the problems from the words and the “knots” in thinking, coding the problems from words into specific mathematic solutions, and identifying the focus and the unit of the solution can be difficult. Understanding psychological difficulties in solving written math problems would contribute to completion for Maths learning in elementary education and establishing important bases for application to enhance effectiveness in teaching written math problems for primary school students.

Keywords: from the perspective of psychology; primary school students' difficulties; the new general education curriculum; written math problems

1. Introduction

Mathematics is a subject with many applications in life. Basic mathematical knowledge and skills help humans solve practical problems in life accurately and systematically and help society grow. Therefore, Mathematics has been assigned into the general education curriculum from grade 1, to prepare for students with basic mathematical knowledge, skills, and symbols, and to upgrade the content after each grade to form thinking development for students (Le, 2000).

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The process of developing and advancing the content in Maths teaching started from recognizing symbols in numbers and calculations, and counting, to using formulas, principles, and theorems to solve specific math problems. In primary education, the target of Maths learning was to be able to carry out simple thinking operations, to state and answer questions during reasoning and solve simple problems, to select suitable operations and formulas to present the ideas and solutions, to use mathematical language in integration with a common language and their body language to present mathematical content in simple situations, to use mathematical tools and means to solve simple math problems (Krutetsky, 1982; Leontiev, 1989). Importantly, one of the transitions in teaching Maths for primary school students is turning simple calculations including additions and subtractions into written math solutions (math solutions including writings such as statements, explanations, and comments). Solving written math problems requires a range of intellectual operations such as thinking processes that break down the problems, which are common sentences, and generalize them into corresponding images and numbers, and solve the requested problem to give one final result.

Thinking processes and intellectual operations used to solve a written math problem could occasionally cause certain difficulties to students, including using language to list the problems, using Vietnamese to explain in math solutions, coding language into a specific math solution, and identifying the focus and the unit in the solution (Nguyen, 1995). However, not all teachers and parents recognized these difficulties. They usually attributed these problems to ineffective Maths teaching. On the other hand, psychologically, students' difficulties could be explained from many perspectives. This is a very important data resource to make suggestions in Maths teaching of the new general education curriculum because the language capacity and math capacity are one of the student capacity development orientation. This article will discuss primary students' difficulties when solving written math problems from the perspective of Psychology.

2. Review

2.1. Basic problems in written math exercises

Solving a math problem was considered as a process consisting of the beginning, the body, and the ending. Solving a written math problem required many psychological processes. There were four steps of solving a written math problem, each step required a number of different psychological processes (Tran & Nguyen, 2003). For the first step, "knowing the question", students needed to be able to recognize key factors within the language, therefore, students needed to have a certain language thinking competence to understand the math problem's language. Moreover, to determine the main point of a math problem, students needed to have imagination competence to discover "hidden factors" within the language. Overall, in this step, cognitive processes were used quite effectively. From perceiving seriously and carefully the request of the math exercise to solving that

request with thinking and imagination operations, many specific and interconnected psychological processes could present in one step of solving a written math problem.

For the second step, “planning a solution to a written math problem”, students must have the ability to reason and predict, to analyze–synthesize, and to break down the math exercise into smaller exercises then synthesize them to solve the whole exercise. The key effect of this step reflects most clearly in the ability to use the analysis–synthesis operation, as well as the ability to plan the solution systemically. This was an effective use of inherent psychological abilities at primary school students.

In the last two steps, “carrying out the plan” and “checking and evaluating the solution,” students must remember calculating rules while doing calculations. Thinking operations and other psychological qualities such as carefulness and seriousness can also be used simultaneously.

The psychological structure of the process of solving a written math problem displays the possibility of being influenced by many psychological factors. These psychological factors include the interest in approaching and solving the math problem; thinking and creative processes such as analysis – synthesis and comparison, in planning and carrying out the plan; language competence, especially the ability to recognize special symbols in mathematical language; competence to fully perceive the math problem, especially the competence to plan thinking operations to solve the math problem; the ability to turn language into models and graphs to find out suitable calculations and vice versa; the ability to use psychological qualities such as determination, patience, efforts, and carefulness during solving process and evaluating the results of the written math problem (Nguyen, 2002).

Therefore, from the perspective of Psychology, interests and the extent of cognitive processes and personality qualities were the reasons causing mental difficulties when solving written math problems for primary school students.

2.2. Difficulties when solving written math problems at primary school students, from the perspective of Psychology

2.2.1. Difficulties in interests

Interest is a special attitude toward an object, shown in attention toward the object, the desire for deep cognition, and the satisfaction with the object. For primary school students, interests are really important to building positivity in solving a written math problem and depend on the interaction from teachers through Maths teaching methods. Students usually have difficulty building interests to solve math problems because teachers’ methods have not yet focused on this issue.

According to a survey of what method teachers have used during teaching Maths, two methods that have been used the most are “presenting typical math exercises with guidelines” and “deliberate practices with advancing complexity.” However, effective methods to stimulate students’ interests to solve written math problems are used quite rarely.

To enhance cognition to develop interests in students, it is necessary to focus on the following methods: “exchanging mathematical language,” “guidelines for solutions based on individuals,” “practicing recognizing and categorizing math exercises,” “practicing re-evaluating results,” and “causing interest with teaching tools.” However, these methods are rarely used.

Table 2.1. Reality of using different methods to develop interests in solving written math problems

No.	Methods	N	Percentage (%)
1	Explaining mathematical symbols	9	25.70
2	Presenting typical maths exercises with guidelines	24	68.57
3	Guidelines for solutions based on individuals	9	25.70
4	Developing interests in teaching tools	15	42.85
5	Deliberate practicing with advancing complexity	31	88.57
6	Practicing recognizing and categorizing Maths exercises	7	20.00
7	Practicing re-evaluating results	11	31.42
8	Paying attention to struggling students	14	40.00
9	Orientation for inverse problem-solving	11	31.42

Students’ difficulties in developing interests to solve math problems might be because of teachers’ limited awareness and ineffective use of different methods to stimulate and enhance the positive cognition of students when solving written math problems.

2.2.2. *Difficulties in cognition*

a. Difficulties in recognizing the request of written math problems

Written math problems were a special type of math exercised in which mathematical language is integrated with symbolic features. Written math problems were consisted of many organized calculations to determine the results, therefore, students needed to be able to identify hidden symbols. These were both special features and requirements that caused difficulties for students to solve written math problems (Levitov, 1971).

According to teachers’ assessment, students’ difficulties in solving written math problems were involved with mentioned requests and features. A total of 35% of the teachers believe students were unable or less likely to be able to understand the language of the exercises due to their limited vocabulary, or yet to identify the exercise’s request, or students understand the request incorrectly; Twenty percent of the teachers state that students cannot distinguish between identifying and epitomizing a math exercise. Forty five percent believed students only used one way of solving provided by teachers without creativity. These limitations in language and thinking operations caused difficulties when solving written math problems.

b. Difficulties in cognition about steps of solutions

The survey results show that students still hold inaccurate cognition about the steps of solutions to math exercises. 62.6% of the students had the wrong sequence of steps. The accurate sequence of steps to solve a math problem was: (1) determining the requests and resources, (2) identifying and epitomizing, (3) choosing the suitable solution, and (4) checking and evaluation. Most of the students were confused between “determining the requests and resources” and “identifying and epitomizing”. Many of them believed “determining requests and resources” must be carried out after the other. Observation on students after receiving the exercises from their students, it was discovered that after reading the request, they immediately epitomized and solved, very few of them underlined what was given and what needed to be solved in the request, or wrote out on paper given information before epitomizing with words or models before solving.

2.3. Suggestions for employment of the new general education curriculum in Vietnam

The new general education curriculum in Vietnam is being employed. With competence-oriented education, competence assessment at students to find out solutions to develop their competencies was based on the learners’ potentials and limitations, and their methods to overcome difficulties. In the new general education curriculum and the Mathematics curriculum, written math problems begin at grade 3 with the following objectives:

- Being able to recognize Roman numerals and write Roman numerals within the range of 20.
- Determining the unknown values of expressions via known values.
- Solving a number of problems associated with doing math exercises consisted of two operations (within learned numbers and calculating operations), involved with practical meanings, factors, and results of the calculations, and the direct and simple comparison (e.g., multiplication and division, then comparing how many times one number is bigger than the other).
- Using a number of common measuring units in practicing weighing, measuring, and counting, and being able to write the statements or comments, and conclusions for the math solutions.

From the analysis of difficulties of students in solving written math problems and from basic contents of general Maths education for students to approach written math problems, these following suggestions should be considered to guarantee the efficiency of teaching written math problems to primary school students.

2.3.1. Suggestions for teachers

- It is necessary to reduce focusing on getting to know math exercises in one way. Chances and conditions should be created for students to prove their cognition positivity in the process of approaching and solving written math problems.

- Pay more attention to mathematical terms, steps of solutions, categories of written math problems with special features to help students easily approach written math problems and perform well.

- Pay more attention to selecting and designing written math problems. Pay more attention to mathematical language factors, helping students overcome the “mathematical language barrier”, to tackle the difficulties when solving written math problems at primary school students.

- Methods stimulating needs and interests to study Maths at students should be used more, such as organizing competitions among students, encouraging students to ask more, and helping students to understand the application of the subject in real life.

- Creating as many opportunities as possible for students to write, visualize, manipulate, and talk about mathematical vocabulary. This is more effective than just merely talking about mathematical terms (Amen, 2006).

2.3.2. *Suggestions for students*

- Students need to be more active in learning, researching, and preparing themselves with mathematical vocabulary to easily understand and solve written math problems. Besides, deliberate training and practicing in writing and presenting ideas of solutions in written math problems are necessary to develop operations and skills to effectively solve written math problems at students.

- Students need to be more active to seek help from their parents, teachers, friends, and others when presenting an idea for a written math problem if that problem is beyond their knowledge. Through receiving help, students can learn how adults use their Vietnamese in solving math problems, their vocabulary in solving math problems is also cumulated.

3. **Conclusion**

Maths helped primary school students form and develop general competencies suitable for the subject and educational level as stated in the general education curriculum. To gradually develop mathematical competence in primary school students, gradual teaching and advancing content through different types of exercises of each grade were necessary and worth concerning, including guiding students to solve written math problems

Through studying students' difficulties in solving written math problems and their psychological traits, it has been found that the operations of presenting the problem from the words or language and the situation in thinking processes and the operations of coding from language into specific math solutions then identifying the focus and the unit of the solutions can be a difficult requirement to primary school students. Analyzing and understanding difficulties from the perspective of Psychology during the math problem-solving processes as mentioned above would contribute to completion for Maths learning in primary education, as well as establish important bases for application to enhance the effectiveness in teaching written math exercises at primary school students in the new general education curriculum.

❖ **Conflict of Interest:** Authors have no conflict of interest to declare.

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**MỘT SỐ KHÓ KHĂN CỦA HỌC SINH TIỂU HỌC KHI GIẢI BÀI TOÁN
CÓ LỜI VĂN NHÌN TỪ GÓC NHÌN TÂM LÝ HỌC
– ĐỀ XUẤT CHO CHƯƠNG TRÌNH GIÁO DỤC PHỔ THÔNG MỚI CỦA VIỆT NAM**

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TÓM TẮT

Bài báo đề cập một số khó khăn của học sinh tiểu học khi giải bài toán có lời văn từ góc nhìn tâm lý học. Việc giải bài toán, đặc biệt là giải bài toán có lời văn, giữ một vai trò to lớn đối với sự phát triển trí tuệ của học sinh tiểu học. Thao tác đưa ra các vấn đề từ lời văn – ngôn ngữ, từ các “nút thắt vấn đề” trong tư duy cũng như mã hóa vấn đề từ ngôn ngữ thành bài toán cụ thể, xác định trọng điểm lời giải và đơn vị là yêu cầu khá khó khăn. Việc tìm hiểu về các khó khăn dưới góc nhìn tâm lý học trong quá trình giải bài toán có lời văn ở học sinh tiểu học sẽ góp phần giúp hoàn thiện ý nghĩa của việc học toán ở bậc học này cũng như xác lập các cơ sở quan trọng để ứng dụng nhằm nâng cao hiệu quả dạy bài toán có lời văn cho học sinh tiểu học.

Từ khóa: góc nhìn tâm lý học; khó khăn của học sinh tiểu học; chương trình giáo dục phổ thông mới; bài toán có lời văn