EUROPEAN ACADEMIC RESEARCH
Vol. IX, Issue 7/ October 2021

Impact Factor: 3.4546 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

Teaching to develop communication skills through open-ended math problems of grade 1 in Vietnam

Dr. NGOC-GIANG NGUYEN[1]
Banking University Ho Chi Minh City, Vietnam
MA. HUYEN-TRANG PHAM
Faculty of Primary Education, Hanoi Pedagogical University Phuc Yen city
Vinh Phuc Province, Vietnam

Abstract:

The ability to communicate math is one of the most important of mathematical competence. Teaching to develop mathematical communication skills helps students share and present ideas that students need to express. Through communication, students communicate, discuss, analyze, and evaluate making the problem clear, coherent, and understandable. In classes, 1st grade is the foundation class to help students form, develop intellect and personality. Teaching problems for first-grade students should focus on open-ended problems. Open problems do not only have one correct solution but also many different correct solutions, depending on how they are understood and how to approach the problem. Through teaching to develop competencies with open-ended problems, teachers will engage students more actively in the lesson, actively expressing their ideas. Students become more active and confident than teaching math problems with only one common answer. Students know how to see the problem fully, turn it over. This way of teaching helps students think more deeply and comprehensively.

Key-words: Teaching to develop competency. Mathematical communication competency. First-grade math problem. Open-ended problem. Creative thinking.

[1] Corresponding author: nguyenngocgiang.net@gmail.com

INTRODUCTION

Mathematical communication is the way of students presenting, expressing thoughts, actions, and results of a given math problem or problem. Mathematical communication can take many different forms of expression. Like regular communication, mathematical communication is also presented by students in four basic forms: listening, speaking, reading, and writing math.

Currently, there have been many authors studying mathematical communication. Elements of mathematical communication include understanding the style of writing, visual representation, and conversation in various ways of understanding languages as well as understanding the math problems. Express the style of literature in many levels of theory and precision, in question type, in visual representation as well as in writing style. (Niss, 2003) In the thesis "Using lesson study to develop mathematical communication competence for junior high school students ", the author wrote about (Hideyo, 2008) saying that mathematical communication in the broadest sense and mathematical communication in the narrow sense are integrated activities in mathematics including problem-solving, reasoning, proofing, and representation. (Hoa, 2014) Brenner saying that mathematical communication has three different aspects. It is communicating about math, communicating in math, and communicating with math. Communicating about math refers to the process of students thinking, solving problems and students state why they choose that solution to solve problems. Second, communicating in math refers to the students' use of the language, symbols, and mathematical representations that are appropriate for the problem at hand. Third, communicating with math refers to students using mathematical knowledge to solve problems in a student's way of understanding. The concept of communicative competence first appeared in 1971 when linguist Hymes distinguished between two types of grammar and use. According to Hymes, competence is the ability to manipulate grammar competencies to ensure that speech is appropriate for specific situations; thereby forming the concept of communicative competence. The ability to communicate is an inherent human ability to understand a situation of language exchange and respond appropriately with or without language. Understanding here means

referring to a semantics not only in the form of reference, semantics, content of the message but also most likely an act, operating at words and by purposeful words. (Dang et al., 2019) Students' level of understanding will increase when they present their ideas in different ways. Through discussion and sharing of ideas students can find the best learning method for themselves. Students' understanding of math is further strengthened by asking questions or giving their answers for other students to comment, evaluate and respond to. (Wilson, 2009) The mathematical communication competence expressed through the implementation of listening comprehension, reading comprehension actions and recording of necessary mathematical information, presented in mathematical texts or written by others; Presenting and expressing (speak or write) mathematical contents, ideas and solutions in interaction with others (with appropriate requirements for completeness and accuracy); Effective use of mathematical language (numbers, letters, symbols, charts, graphs, and logical links, etc.) in combination with a common language or physical movements when presenting, explaining, and evaluating mathematical ideas in interaction (discussion, debate) with others. (Do et al., 2016) The current understanding of developing communication capacity is diverse and sometimes confusing for many people. (Nguyen et al., 2017)

Teachers need to ask open-ended questions with various solutions in a math class related to problem-solving and mathematical creativity. Teachers can use visuals, ask open-ended questions to encourage students to be curious about finding possible answers. (Azizaa, 2018) Teaching with open-ended questions is a form of traditional teaching. This is a learner-centered teaching method that helps students develop collaborative capacity, develop activities, skills outside the classroom. (Demir & Sahin, 2014) Developing a model of self-study through open questions will increase students' creativity in the calculation. The way of teaching through open-ended questions will consist of 5 stages. First, provide specific goals and motivation for learning; Second, provide a way to work individually and in teamwork; Third, assign each group to work with open-ended questions; Fourth, feedback to the work of the group; Fifth, evaluate, reward, and emphasize the independence and activeness of students. (Arsyad et al., 2017)

Some benefits of teaching open-ended math problems. First, it provides a free learning environment and supports student development. Second, the benefits of teaching open-ended math problems for students are numerous. Open-ended problems allow you to see the problem in different ways. Each of such approaches will give us a solution. Each student has the opportunity to develop their unique solutions. Third, students have the opportunity to apply and use all their knowledge and skills. Fourth, with many different approaches, students can assess the advantages and disadvantages of each solution, thus drawing their comments. Fifth, teachers can enrich their knowledge from student solutions. Finally, students have an excellent opportunity to develop creative thinking, especially creative mathematical thinking. (Mohammad, 2013) (Capraro et al., 2007) Closed tasks and open-ended tasks. Empirically based on 1200 students, the authors draw both types of exercises that are important and contribute effectively to the teaching process. (Sullivan et al,. 2000) Fatah et al (2016) also said that open-ended teaching will promote students' creative thinking more than traditional teaching. (Fatah, et al., 2016)

Compared to the multi-choice problem, the open-ended selection problem has three distinct advantages. First, teachers get rid of the correct choice sentences by accident, as well as collect more accurate information about the open-ended problem. Second, students cannot use elimination thinking in problems with open-ended questions. Third, there is no exact suggestion to find the right solution for an open-ended problem like in a multi-choice problem. (Güler, 2014) The pros and cons of open-ended questions. Open-ended questions help learners think deeply about the issues raised. Respondents depend on points of view, understanding, and argument to give solutions to questions. The disadvantage of an open-ended question is that it is difficult to have a single answer; many different respondents will make the question more clearly than one person. Open-ended questions have personal opinions and feelings. So if the interviewer biases the respondents, the results will not reflect the individual's true strength. (Michael & Jeremy, 2016)

The point that an open-ended question is a question with many different ways of answering. Open-ended questions will engage students, develop students' higher-order thinking, as well as develop their vocabulary, language skills, and cognitive skills. Teachers are

people who build knowledge with students. (Cakır & Cengiz, 2016) The role of open-ended problems in mathematics education. The author offered open problems on algebra and arithmetic. The author emphasized that open problems bring mathematics closer to real life. (Wu, 1994) The role of open-ended questions and feedback in teaching math effectively. (Sabilah & Manoy, 2017) Teachers often ask more open questions than closed questions. Open-ended questioning will strongly influence the development of children's thinking and personal activities. (Bay & Douglas, 2015)

The advantage of abductive reasoning occurs when the student is placed in a problematic environment and the conclusions drawn from the given data remain questioning and require students to come up with their hypotheses and find appropriate explanations. Open-ended problems meet these conditions well. (Truong, 2011) The open-ended questions (open-ended problems) have been developed in Japan since the 1970s and is now widely used in England, Germany, the Netherlands, the United States, etc. Tran also pointed out the benefits, advantages and disadvantages when exploiting the open-ended questions in PISA to teach Math for Middle School students. (Tran, 2014)

There have been many researchers in grade 1 math, for example, grade 1 math textbooks (Do et al., 2016), fostering maths for the Volympic exam (Pham, 2016), common math problems and types in grade 1 (Chew, 2016) etc. However, the topic of teaching and developing communication skills through open-ended problems in grade 1 in Vietnam is still relatively new and has not been studied by anyone.

From the above features, the article will focus on answering three questions in the article:

1. What are the levels of mathematical communication competency through open-ended problems in grade 1?

2. How many steps of teaching process to develop communication competence through open-ended problems?

3. How does an illustrative example of teaching and developing communication skills through open-ended problems in grade 1 in Vietnam?

MATERIALS AND METHODS

These Conditions or Situations Can Provide Many Opportunities for Students to Communicate Mathematically

These are the conditions or situations that can provide opportunities for students to communicate mathematically. First, when students have a conflict between old knowledge and new knowledge, they realize that newly acquired knowledge is useful to them. At that time, students are confident in communicating and expressing themselves. Second, students demonstrate their results or what they find out is true for others. Third, students reject or support the mathematical reasoning of others. Fourth, teachers always respect students' opinions or arguments. Finally, teachers change the way they ask questions to innovate their assessments, thereby increasing their ability to think mathematically, students confidently communicate and the learning outcomes are in favor of mathematical reasoning. (Hoa, 2011)

Levels of Mathematical Communication Competency through Open-Ended Problems in Grade 1

The level of mathematical communication competence of grade 1 students in particular and primary education, in general, is shown in the following table:

Table 1. Table Describing the Level of Mathematical Communication Competence of Elementary School Students

Ordinal number	Components (according to the Mathematics General Education Program 2018)	Levels				
		0	1	2	3	4
1	Listening comprehension, reading, and recording of necessary mathematical information presented in written form spoken or written by other people	Students do not yet understand and take notes of necessary math problems presented in mathematical documents or spoken or written by other people.	Initially, students can listen, understand and record some necessary math information, but there is little information or there is a lot of information that is wrong.	Students can listen, read and take notes (summarize) some necessary math information, but incomplete or with few errors.	Students can listen, read and record relatively sufficiently and accurately information about necessary problems and identify problems to be solved.	Students can listen, read and take notes fully and accurately about necessary math problems, distinguish (mark) important information in sequence and identify problems to be solved.
2	Present and express (speak or write) mathematical content, ideas, and solutions in interaction with others	Students are confused, do not know how to present and express the content, ideas, and solutions related to the problem. For example, do not know how to write the solution, can not	Students can initially present and express mathematical content in familiar problems.	Students can present, express content, ideas, and solutions related to the problem relatively accurately and appropriately in	Students can present and organize the contents, ideas, and solutions to the problem concisely and clearly.	Students can present and express clearly and know how to reason closely and logically about the content and solution ideas about the problem in interacting with others.

		reproduce the problem, etc.		interacting with others.		
3	Effective use of mathematical language combined with a common language or physical movements when presenting, interpreting and evaluating mathematical ideas in interaction with others.	Students do not know how to use vocabulary, terminology, symbols, etc. in the process of solving problematic texts.	Students do not know how to use terms, symbols, ... logically, closely and concisely in the process of solving math problems.	Students can understand and use mathematical language in the form of familiar symbols.	Students can use mathematical language in combination with natural language while presenting, explaining, and evaluating ideas related to the problem relatively accurately and effectively.	Effective use of mathematical language in combination with natural language or body movements while presenting, explaining, and evaluating ideas related to the problem.
4	Students show confidence when presenting, expressing, asking questions, discussing, debating mathematical content and ideas.	Students are not confident in presenting, expressing, asking questions, discussing, etc. for example, do not dare to ask teachers, friends, or do not know where to start, do not know how to ask questions.	Students can initially participate in discussion, debate, ask questions and so on related to familiar problems, but still timid and embarrassed.	Students can present, express, and discuss content and ideas about problems.	Students actively participate in discussions, debates, and ask questions about the content and ideas related to the problem and present and communicate fluently.	Students are confident in presenting, expressing and proactively asking questions, participating in discussions, debating, commenting, and evaluating problems.

(Ministry of Education and Training, 2018) (Dang et al., 2019)

The Teaching Process to Develop Communication Competence through Open-Ended Problems

Step 1. Raise the open-ended problems

The teacher is the one who comes up with open-ended problems. The open-ended problems can be problems in textbooks or problems from references. The selection of math problems in teaching must be carefully screened. The problem must be a problem that is not too difficult for students to do, but not too easy to see the solution. If it is too difficult, the teaching process will be difficult. If it is too easy, students will not be interested in learning. The problem can be geometric or arithmetic.

Step 2. Find the solution to the problem

The teacher asks students to solve the problem that the teacher just raised. After finding the answer, the teacher asks the students to present their answers to the whole class. At this step, students exercise their mathematical communication skills. The teacher assesses students' ability to present solutions.

Step 3. Organize the debate for the open-ended problem

The teacher holds a debate for students to find solutions to the open-ended problem. If students have only found one solution to the

problem, the teacher should direct the student to another solution by asking:

- Can you find another solution?
- Observe the drawing (or pay attention to the problem data), if we consider this data more, we will have another solution. Can you tell me what that other solution is?

In this step, the teacher assesses the students' ability to communicate mathematically through the way students respond.

Step 4. Give a solution to the problem

What answers does the open-ended problem have? Are these answers accepted? The teacher closed the solution to the problem.

Step 5. Dig deep the problem

By generalizing, specializing, analogizing, and overturning the problem, the teacher develops the original open-ended problem into other problems. Other problems may be open-ended problems or ordinary problems. The teacher continues to have students practice with the new math problem. The teacher focuses on student presentations. This practice is called teaching maths to develop creative thinking. In the new Bloom thinking ladder, creative thinking is the highest thought among the thinking scales.

An Illustrative Example of Teaching and Developing Communication Skills through Open-Ended Problems in Grade 1 in Vietnam

Step 1. Raise the open-ended problem

Problem 1. Number?

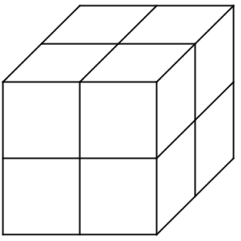

Figure 1. Cubes, Vietnam (Personal Collection)

(Tran et al., 2019)

Step 2. Find the solution to the problem

This is a first-grade problem. The teacher guides the students to solve the problem. As a result, they found eight cubes. They demonstrate relatively good mathematical communication skills.

Step 3. Organize the debate for the open-ended problem

The teacher draws a comment: This problem has many interpretations. If we think that, "How many small cubes are there in the cube?", then there are 8 small cubes as the students have shown. However, if we think that "How many cubes are there in the cube?", then how many cubes are there now?

Some students began to doubt, trying to find out the answers to the questions that the teachers asked. Finally, the best student in the class found the answer. She presented the solution that revealed good mathematical communication skills:

- There are nine cubes including eight small cubes and one big cube.

Step 4. Give a solution to the problem

This problem has two answers. If the question is "How many small cubes are there in the cube?", then there are eight small cubes; If the question is, "How many cubes are there in the cube?", then there are nine cubes, including eight small ones and one big cube.

Step 5. Dig deep the problem

The teacher proposes some similar problems where the solution and thinking are the same as problem 1. The teacher raises the following problems:

Problem 2. Number?

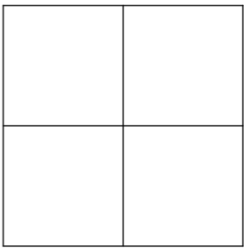

Figure 2. Squares, Vietnam (Personal Collection)

Problem 3. Number?

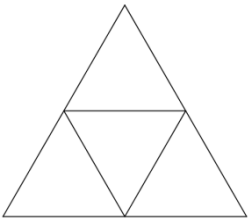

Figure 3. Triangles, Vietnam (Personal collection)

Problem 4. Number?

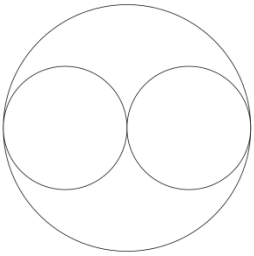

Figure 4. Circles, Vietnam (Personal collection)

Problem 5. Number?

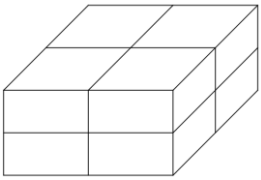

Figure 5. Rectangular Prisms, Vietnam (Personal collection)

Problem 6. Number?

Figure 6. Rectangular, Vietnam (Personal collection)

After students understand the solution to problem 1, they can also give the correct solutions to the problems. They demonstrate good mathematical communication skills. The solutions to the problems are as follows:

Problem 2

If the question is: "How many small squares are there in the picture?", there are four small squares.

If the question is: "How many squares are there in the picture?", then there are five squares.

Problem 3

If the question is: "How many small triangles are in the picture?", there are 4 small triangles.

If the question is: "How many triangles are in the picture?", then there are 5 triangles.

Problem 4

If the question is: "How many small circles are there in the picture?", there are 2 small circles.

If the question is: "How many circles are there in the picture?", there are 3 circles.

Problem 5

If the question is: "How many small rectangular blocks are there in the picture?", then there are eight small rectangular blocks.

If the question is: "How many rectangular blocks are there in the picture?", then there are twenty-one rectangular blocks including eight small rectangular blocks, tweleve medium rectangular blocks (each one includes two small rectangular blocks) and one large rectangular block.

Problem 6

If the question is: "How many small rectangles are there in the drawing?", there are four small rectangles.

If the question is: "How many rectangles are there in the drawing?", then there are five rectangles.

Pedagogical Experiments

Experimental purposes

Pedagogical experiments are conducted to test the feasibility and effectiveness of teaching open-ended problems to teach students about

the ability to predict, rational reasoning, math communication skills and how to look at problems in different ways.

Organization and experimental content

Experimental organization

The pedagogical experiment was conducted at Co Loa Primary School, Phu Nhuan District, Ho Chi Minh City.

+ Experimental class: 1/1.
+ Control class: 1/2.

Experimental classroom teacher: Ms. Pham Thi Kim Anh.

Control class teacher: Ms. Nguyen Huynh Thanh Dung.

With the consent of the Board of Directors of Co Loa Primary School, we studied the academic results of grade 1 of the school and found that the general level in Mathematics of classes 1/1 and 1/2 is equivalent. On that basis, we propose to be experimented in class 1/1 and take class 1/2 as the control class.

The School Board of Directors, the teachers of the Mathematics team and the teachers in classes 1/1 and 1/2 accept this proposal and create favorable conditions for us to experiment.

Experimental content

The experiment is conducted during 10 periods of Chapter 2. It's about addition and subtraction within 10. After experimenting, we give students a test. This is the content of the test:

Test (30 minutes)

Question 1

Please talk about the numbers 0, 1, 2, 3, 4, 5 through what you see every day.

Question 2

Minh has three balls. An has fewer balls than Minh. How many balls does An have?

Question 3

Minh's mother asked him to give the fruit to everyone in the house and said: "Please give your grandpa 5 pieces, grandma the same as him, daddy fewer than grandpa, mommy the same as daddy, Minh fewer than daddy, Lan the same as Minh ". How many pieces does each person get?

Questions like the ones above contain pedagogical intent. I'll analyze more about this and at the same time a preliminary assessment of the quality of student work.

First of all, it must be said that both questions in the test are not too complicated to answer.

For Question 1: Talk about the numbers 0, 1, 2, 3, 4, 5 through what you see every day.

This question intends to test whether students grasp the practical application of numbers in life. Do they know how to present or are they good at communicating math?

Question 2 is a test of reasoning ability more and less. An has fewer balls than Minh, so An can have 0, 1 or 2 balls.

Question 3 is a question that tests students' reasoning ability. Because his father has fewer fruit pieces than his grandfather, his father's number of fruit pieces is only 5, 4, 3, 2 or 1. Thereby infer that Minh and Lan's number of pieces is smaller than that of their father, so the problem has many different answers. This problem tests the students' mathematical communication skills.

This problem, experimental students give more answers than students in the control class.

The evaluation of experimental results

Qualitative evaluation

The difficulties and mistakes of students are related to the prediction and deduction of open-ended problems. The intentional analysis of the test as well as the preliminary assessment of the test results once again shows that: the ability to predict and find many answers to open-ended problems is limited. This comment was also drawn from many teachers at primary schools.

When the experiment process is just started, observing the quality of answering questions as well as solving exercises, we can notice that in general, the students in the control class and even the experimental class don't know how to offer different solutions to open-ended problems.

For teachers, they are also afraid to teach open-ended problems, even though they know that ignoring teaching students to deduce, finding many answers is not suitable for positive teaching

methods, but sometimes they have to accept because they have not found an effective way to teach students effectively.

After conducting experiments, teachers of experimentation have the idea that there is nothing difficult to teach an open-ended problem. In particular, asking and guiding appropriately help students develop independence and positiveness. Students acquire knowledge of teaching methods of open-ended math problems in the exploration and prediction process.

Teachers are interested in teaching open-ended problems. The difficulties and mistakes of students in thinking that the problem has only one solution have greatly reduced and especially have formed for students a different way of thinking. Students like to develop thinking, enjoy open-ended problems. Students enjoy presenting and the ability to communicate math getting better.

Quantitative evaluation

Table 2. Statistics of Marks

Grades / Classes	0	1	2	3	4	5	6	7	8	9	10	Total exams
Control	0	0	0	1	3	10	18	9	1	0	0	42
Experimental	0	0	0	0	2	4	8	12	12	6	0	44

Control class: Poor 9,52%; Average 66,67%; Fair 23,81%; Good 0%.
Control class: Poor 4,54%; Average 27,27%; Fair 54,54%; Good 13,65%.

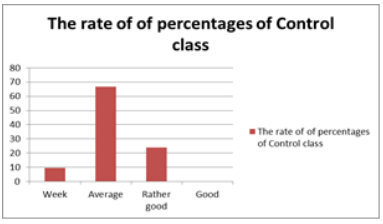

Figure 7. The Rate of Percentages of Control Class, Vietnam (Personal Collection)

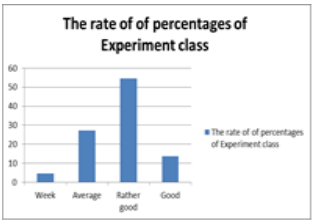

Figure 8. The Rate of Percentages of Experimental Class, Vietnam (Personal Collection)

Empirical results show that the experimental purpose has been fulfilled, the feasibility and effectiveness of the measures have been confirmed. Teaching open-ended math problems will contribute to developing mathematical communication skills, predictive and

rational reasoning skills for students, and contribute to improving the effectiveness of teaching mathematics to elementary students.

From the student test results, we have the following score distribution:

Table 3. The frequency distribution of test scores of the two classes

		test scores							Total
		3,0	4,0	5,0	6,0	7,0	8,0	9,0	
Type	Experimental	0	2	4	8	12	12	6	44
	Control	1	3	10	18	9	1	0	42
Total		1	5	14	26	21	13	6	86

We get the following chart and table of typical statistics parameters from the table above.

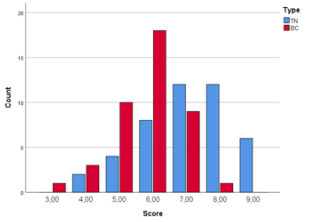

Figure 9. The Chart Comparing Scores of Two Classes

From the graph, we can see that the scores of the experimental class are from 4-9 points and the majority are 7-8 points. The control class scores are 3-9 points and the majority are 6 points.

Table 4. The Characteristic Parameters of the Score Statistics for the Two Classes

		scores		
		Mean	Standard Deviation	Variance
type	Experimental	7,05	1,35	1,81
	Control	5,81	1,02	1,04

We comment on the characteristic parameters of the scores for the two classes as follows:

The GPA of the experimental class is higher than that of the control class. And the experimental class has lower dispersion around the mean than the control class because of lower standard deviation and variance.

In general, we can say that the scores of experimental class are higher than those of the control class.

However, to ensure the accuracy of the difference (high or low) between the average scores of the two experimental classes, we conducted the average test between the two classes, with the significance level $\alpha = 0,05$ shown in Table 11 with the following two assumptions:

Hypothesis H0: "The average scores of the experimental class and the control class are similar".

H1: "The average score of the experimental class is higher than that of the control class".

Table 5. T-Test Test Table on Average Scores of Two Classes

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
scores	Equal variances assumed	2,980	,088	4,786	84	,000	1,23593	,25825	,72237	1,74950
	Equal variances not assumed			4,817	79,883	,000	1,23593	,25660	,72526	1,74660

Reading the figures from the table above, we have the following comment:

- Levene test has $Sig. = 0,088 > \alpha = 0,05$, we have, variance of two classes is the same, using Independent-samples T-test results corresponding to equal variances assumed.

- Independent-samples T-test has $Sig.(2-tailed) = 0,000 < \alpha = 0,05$, so we reject hypothesis H_0, accept hypothesis H_1. Therefore, the average score of the experimental class was 5% higher than that of the control class.

CONCLUSION

Teaching to develop communication skills through open-ended problems of grade 1 in Vietnam is a relatively new way of teaching. This method of teaching helps students develop positive, predictive, and mathematical creativity. Students know how to look at problems

in different ways. Students are more interested and excited about learning open-ended problems than traditional math problems. Students are more likely to argue with their peers than to do regular math problems. Before teaching open-ended problems, children are only used to presenting mathematical solutions under yes or no questions or answers with only one correct answer. After learning open-ended problems, the students had a multi-dimensional view of the solutions to the problem. The problem not only has one more answer, but it can have many different answers. An open-ended problem is a problem with a "lack of structure" that requires students to work out the problem on their own. Students must observe the figure, pay attention to the missing data of the hypothesis to find an appropriate math problem. In our own opinion, teaching to develop communication skills through open-ended problems contributes to helping students gain confidence and help them become more interested in mathematics.

Acknowledgements

We are very grateful to Nguyen Viet Duong to read and improve this article.

REFERENCES

1. Arsyad, N., Rahman, A., & Ansari, S. A. (2017). Developing a self-learning model based on open-ended questions to increase the students' creativity in calculus. *Global Journal of Engineering Education*, *19*(2), 143–147. https://doi.org/https://doi.org/10.26858/gjeev19i2y2017p143147
2. Azizaa, M. (2018). The use of open-ended question pictures in the mathematics classroom. *New Trends and Issues Proceedings on Humanities and Social Sciences*, *4*(9), 1–9. https://doi.org/https://doi.org/10.18844/prosoc.v4i9.3036
3. Bay, D. N., & Douglas, K. H. (2015). Teachers Asking Questions in Preschool. *International Journal of Humanities and Social Science*, *5*(7), 60–76.
4. Cakır, H., & Cengiz, O. (2016). The use of open-ended versus closed-ended questions in Turkish classrooms. *Open Journal of Modern Linguistics*, *6*, 60–70. https://doi.org/https://doi.org/10.4236/ojml.2016.62006
5. Capraro, M., Capraro, R., & Cifarelli, V. (2007). *What are Students Thinking as they Solve Open-ended Mathematics Problems?* https://www.academia.edu/10743392/What_are_students_thinking_as_they_solve_%0Aopen-ended_mathematics_problems%0A

6. Chew, T. (2016). *Maths Olympiad-Unleash the maths Olympiad in you Junior 1*. Vietnam: World Publishing House.
7. Dang, T. T, Le, T, T. H. Tran, T. (2019). Levels of assessment of mathematical communication in solving word math problems in elementary school students. *Vietnam Education Review*, *7*(Special), 205–210.
8. Demir, S., & Sahin, F. (2014). Assessment of open-ended questions directed to prospective science teachers in terms of scientific creativity. *Procedia-Social and Behavioral Sciences*, *152*, 692–697. https://doi.org/https://doi.org/10.1016/j.sbspro.2014.09.264
9. Do, D. H., Nguyen, A., Do, T. H., Pham, T. T. (2016). *Toán 1*. Vietnam: Vietnam Education Publishing House.
10. Fatah, A., Suryadi, D., Sabandar, J., & Turmudi. (2016). Open-ended approach: an effort in cultivating students'mathematical creative thinking ability and self-esteem in mathematics. *Journal on Mathematics Education*, *7*(1), 9–18. https://doi.org/https://doi.org/10.22342/jme.7.1.2813.9-18
11. Güler, N. (2014). Analysis of Open-Ended Statistics Questions with Many Facet Rasch Model. *Eurasian Journal of Educational Research*, *55*, 73–90. https://doi.org/https://doi.org/10.14689/ejer.2014.55.5
12. Hideyo, E. (2008). We Shall Overcome Dysfunctional Beliefs For Introducing Communication Study. *Proceedings of APEC – Khon Kaen International Symposium on 25-29 August 2008 at Khon Kaen University "Innovative Teaching Mathematics through Lesson Study III - Focusing on Mathematical Communication,"* 70–91.
13. Hoa, A. T. (2011). Using open-ended questions to stimulate students in mathematical communication. *Journal of Science Ho Chi Minh City University of Education*, 121–124.
14. Hoa, A. T. (2014). *Using lesson study to develop mathematical communication competence for junior high school students*. Ph.D. thesis, Ho Chi Minh City University of Pedagogy, Vietnam.
15. Michael, R. H., Jeremy, J. S. (2016). Open- versus Close-Ended Survey Questions. *Business Outlook*, *14*(2), 1–5.
16. Ministry of Education and Training. (2018). *Comprehensive general education program*. https://data.moet.gov.vn/index.php/s/m6ztfi7sUIIGQdY#pdfviewer
17. Mohammad, A-A. (2013). The Effect of Open-ended Tasks –as an assessment tool- on Fourth Graders' Mathematics Achievement, and Assessing Students' Perspectives about it. *Jordan Journal of Educational Sciences*, *9*(3), 345–351.
18. Nguyen, T. H. H., Nguyen, T. H. T., & Nguyen, T. H. (2017). Some perspectives on developing communicative competence in foreign language teaching. *Vietnam Education Review*, *8*(Special), 276–279.
19. Niss, M. (2003). Mathematical Competencies and the Learning of Mathematics : the Danish Kom Project. *Proceedings of the 3rd Mediterranean Conference on Mathematical Education*, 115-124.
20. Pham, V. C. (2016). *Fostering Violympic excellent students in Math 1*. Vietnam: Ho Chi Minh City General Publishing House.
21. Sabilah, I., & Manoy, J. T. (2017). The Use of Open-Ended Questions with Giving Feedback (OEQGF) for Effective Mathematics Learning. *Journal of Physics: Conference Series*, *947*, 012032. https://doi.org/https://doi.org/10.1088/1742-6596/947/1/012032

22. Sullivan, P., Warren, E., & White, P. (2000). Student's responses to Content Specific Open-ended Mathematical Tasks. *Mathematics Education Research Journal*, *12*(1), 2–17. https://doi.org/https://doi.org/10.1007/bf03217071
23. Tran, D. H., Nguyen, D. K., Dao, T. L., Nguyen, T. V. (2019). *Mathematics 1 volume two*. Vietnam Education Publishing House.
24. Tran, T. N. (2014). Exploiting the open-ended questions in Pisa into teaching Maths to junior high school students. *Vietnam Education Review*, *36*, 53–61.
25. Truong, T. K. P. (2011). The potential of open-ended problems in assisting students to develop extrapolation in thinking ability. *Vietnam Education Review*, *276*, 34–36.
26. Wilson, B. (2009). *Mathematical Communication through Written and Oral Expression*. https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1077&context=mathmidactionresearch
27. Wu, H. (1994). The Role of Open-ended Problems in Mathematics Education. *The Journal of Mathematical Behavior*, *13*(1), 115–128. https://doi.org/https://doi.org/10.1016/0732-3123(94)90044-2