

Determinants of Problem-Solving Skills in Natural and Social Subjects of Primary School Students in Vietnam



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ABSTRACT: One of the important skills of the 21st century is problem solving. This is an important skill in the group of thinking skills and it is indispensable in the life of every human being in the world. In education, problem-solving skills are also one of the necessary and important skills to form and develop for students. The purpose of this study is to explore the factors affecting the problem-solving skills in natural and social subject of primary school students in Vietnam. The exploratory factor analysis method was used to determine the factors and processed data through SPSS software. Research results from 250 primary school students (grades 1 to 3) from different regions living in Vietnam have shown 7 main factors affecting problem-solving capacity through the natural and social subject of primary school students including: student trust and effort; attitude towards the subject; teaching skills of teachers; concentration; perseverance; the need to communicate with the surroundings, and the motivation for academic achievement. This research result provides more theoretical basis for education researchers, from which to have teaching strategies to develop problem-solving capacity for students.

KEYWORDS: skills, solving-problem, primary, students, nature and social subject.

I. INTRODUCTION

21st century skills are a set of knowledge, skills, work habits and personality traits most necessary for a perfect life in today's world, especially in learning and future career development (Rahman 2019). According to Binkley and his colleagues, there are four groups of skills of the 21st century: ways of thinking, ways of working, tools to work, and living in the world (Binkley et al. 2012). Problem solving is a critical talent in the set of thinking abilities that is required in every person's life. Problem solving is also the most crucial talent that students worldwide, both in and out of school, must learn and master (Rahman 2019). Students must have good problem-solving and communication skills to be competitive and dedicated to this era (Dewi, Poedjiastoeti, and Prahani 2017).

A problem is a circumstance in any aspect of life in which a person wants to attain or complete a task within a specific time frame but does not know how to successfully bridge the gap between their current situation and where they want to be (Rahman 2019). A problem is a circumstance in which a person attempts to solve a problem but does not know how (Karatas and Baki 2013).

Problem solving is regarded as an important life skill because it involves a variety of processes such as analysis, interpretation, inference, prediction, evaluation, and reflection (Anderson 2009); it is an intellectual process of the brain that discovers an explanation for a specific problem or discovers a technique to achieve a given goal (Wang and Chiew 2010). Problem solving offers several benefits, including boosting student accountability, leading them to seek, improving their interest in learning, providing students with lifetime learning, and increasing student motivation, etc. (Fisher 1999). PISA (2012) defines problem-solving competence as "...the capacity of an individual engaged in cognitive processing to grasp and solve issue situations when the solution approach is not evident, and straight away." It involves the willingness to engage in such situations in order to reach one's full potential as a constructive and thoughtful citizen (Co-operation and Development 2014).

According to Santrock (2011), problem solving is the capacity to identify a solution through a process of acquiring and arranging information (Dewi, Poedjiastoeti, and Prahani 2017). There is a prevalent belief that problem-solving abilities assist individuals in easily overcoming obstacles in their daily lives (Özreçberoglu and Çağanağa 2018).

II. LITERATURE REVIEW

There have been quite a few studies on problem solving, each of which has different methods and is geared towards understanding problem solving skills in certain areas. Pimta et al investigated the factors influencing 6th graders' arithmetic problem solving abilities and discovered characteristics such as focus, attitude toward math, motivation for academic performance, self-esteem, and teacher behavior (Pimta, Tayraukham, and Nuangchalerm 2009). Bicer et al researched measures to develop problem-solving skills

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through math, the authors identified the importance of problem-solving skills (Bicer, Capraro, and Capraro 2013). Yu et al study on strengthening problem solving skills for students through context includes the following steps: (1) defining and analyzing problems, (2) collecting data, (3) creating problem possible solutions, (4) selecting the optimal solution, (5) implementing the optimal solution, (6) evaluating the results, and (7) modifying the solution based on the results (Yu, Fan, and Lin 2015). In another study, Sophonhiranrak et al identified factors influencing creative problem solving skills in blended learning environments, which include: 1) understanding challenges, 2) generating ideas, 3) preparation for action, 4) planning an individual approach; and 1) learning activities, 2) learning resources, 3) feedback, 4) interactive learning, and 5) assessment. There have also been research on the problem-solving abilities of elementary (Yavuz, Yasemin, and Arslan 2017) and high school students (İncebacak and Ersoy 2016), (Lestari 2019). Malangtupthong et al. recently investigated the factors influencing the capacity to solve mathematical problems. According to research, teaching techniques and instructors' attitudes toward math are variables that favorably improve math problem solving ability; factors that positively affect attitudes toward arithmetic are teacher achievement and teaching motivation (MALANGTUPHTHONG, NURITTAMONT, and PHAYAPHROM 2022).

Studies examining the elements that influence pupils' problem-solving abilities have some similarities but also varies from nation to country. In this study, we look at the factors that influence Vietnamese primary school students' problem-solving abilities in the topic of nature and society.

III. MATERIALS AND METHODS

A. Participants

The survey is created using the Google Forms program (which enables for the collection of information from many different replies from respondents) and distributed to students' parents via Zalo and Facebook. The study team invited the children's parents to read the content of the survey questions and encourage the primary children (grades 1, 2, and 3) to select an option according to their personal evaluation between July 10, 2022 and July 17, 2022. The estimated number of survey participants is 300 people, the response rate is 84.7% (254 responses), 4 answers are invalid because only one option is selected. The final total data to include in the analysis was 250 (98.42%). Table 1 summarizes the data from the survey, the proportion of men accounted for 47.2%, while the proportion of women accounted for 52.8%. Grade 1 students participated in the survey with 52 students (20.8%), 2nd graders 76 (30.4%), 3rd graders 122 (48.8%). The student's living area surveyed related to problem-solving ability through nature and social subjects mainly concentrated in the urban area with the number of 101 students (40.4%), ranked second is the number of students in rural areas with 88 students (35.2%), 24 students in district centers (9.61%), the rest are in remote areas with 4 students (1.6%).

Table 1. General information about participants (n= 250)

Variables		Number	Percentage
Gender	Male	118	47.2
	Female	132	52.8
Grade	1	52	20.8
	2	76	30.4
	3	122	48.8
Area of living	Rural	88	35.2
	District	24	9.6
	Urban	101	40.4
	Town	33	13.2
	Remote area	4	1.6
Total		250	100

B. Instrument and measurements

The research team chose 31 questions after examining survey questions used throughout the world and in the country on factors impacting children's problem-solving ability: questions about motivation, academic achievement (Afrifa-Yamoah 2016); efforts (Tsai et al. 2014); teacher behaviors; student concentration (Chen, Yang, and Hsu 2013); attitude towards the subject (Kasimu and Nantomah 2019)

Scales and questionnaires are created and sent to students via Google Form (see Table 2). A five-point Likert scale (1 = Totally disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree) was used to measure the degree of agreement for each question.

Table 2. Questions used in the survey

Code	Question
Q1	I always try my best in studying.
Q2	I like to answer difficult questions.
Q3	I always find a way to answer difficult questions.
Q4	I always want to receive compliments from teachers when studying.
Q5	I just like to study natural and social subjects.
Q6	I prefer to learn simple material; I dislike learning complicated material.
Q7	I always want to be successful in school.
Q8	I always review the content I have learned about nature and society.
Q9	I'm always learning more about the world around me.
Q10	I can achieve the goals that I have set.
Q11	When faced with difficult tasks, I make sure to complete them.
Q12	I think I can achieve results that are important to me.
Q13	I believe that I can succeed with what I plan.
Q14	I will be able to successfully overcome many challenges.
Q15	I am confident that I can effectively perform a variety of tasks.
Q16	The teacher gave examples for the exercises that I found very easy to understand.
Q17	The teacher commented on my work very clearly.
Q18	The teacher taught me the lesson very well and easy to understand.
Q19	When I make a mistake, I will be punished by the teacher.
Q20	Teachers often talk to me.
Q21	During class, I always listen attentively.
Q22	When there is noise around, I still study well.
Q23	When I was studying, sometimes I didn't listen to the teacher's lecture.
Q24	There are not good lessons, I still study seriously and listen to the teacher's lesson fully.
Q25	I often forget what I have learned.
Q26	I often remember what the teacher taught.
Q27	The subject of nature and society is not difficult for me.
Q28	I am more willing to study nature and society than other subjects.
Q29	I feel very confident when studying natural and social subjects.
Q30	I really enjoy studying natural and social subjects.
Q31	I always enjoy natural and social classes.

C. Data Analysis

For data analysis, the present study used Exploratory Factor Analysis (EFA). EFA is a quantitative analysis approach that condenses a large collection of interdependent variables into a smaller number of variables (referred to as factors) while keeping the majority of the original set of variables' information. It tries to determine the basic structure of a set of variables. Each index in the set of indices is assumed to be a linear function of one or more common factors and a single factor in the EFA. Common factors are unobservable, hidden variables that impact many indicators in a set of indicators. Unique factors are latent variables that are supposed to impact just one component from a set of indices and do not consider the indicator of the correlations. Before completing the EFA, descriptive statistics were utilized to evaluate the relevance of the 31 survey items. For each item in the descriptive statistics table, the research team calculated the mean of all responses and the standard deviation (SD). If a statement's mean is near to 1 or 5, the team will remove it from the table since it may weaken the quality of the correlation between the remaining items. As a result, the distribution's normality was confirmed by testing for skewness and kurtosis. After establishing the distribution's normality, SPSS 26 software was used to conduct exploratory factor analysis.

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IV. RESULT AND DISCUSSION

Before establishing the factors influencing the problem solving capacity of primary school students, it is required to examine the KMO and Bartlett tests using SPSS software. The parameters generated by the EFA approach are approved if the Kaiser-Meyer-Olkin measurement is larger than 0.6 and the sig value is less than 0.05 (Hair 2009). According to the data in Table 3, the Kaiser-Meyer-Olkin measurement has a value of 0.897, which is greater than 0.5 (Kim and Mueller 1978).

Table 3. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.897
Bartlett's Test of Sphericity	Approx. Chi-Square	3557.313
	df	465
	Sig.	.000

Bartlett's test of sphericity gives the results $\chi^2(465) = 3557.313$, $p < 0.000$, showing that there is a large enough correlation between the question items to conduct exploratory factor analysis.

A. Exploratory factor analysis

Table 4. Eigenvalue, Total Variance Explained of factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.932	32.039	32.039	9.932	32.039	32.039	5.429	17.512	17.512
2	2.454	7.917	39.956	2.454	7.917	39.956	3.234	10.432	27.944
3	1.629	5.256	45.211	1.629	5.256	45.211	2.808	9.057	37.001
4	1.426	4.600	49.811	1.426	4.600	49.811	2.247	7.250	44.251
5	1.376	4.440	54.252	1.376	4.440	54.252	2.240	7.224	51.475
6	1.215	3.920	58.171	1.215	3.920	58.171	1.641	5.293	56.768
7	1.095	3.533	61.704	1.095	3.533	61.704	1.530	4.936	61.704
8	.975	3.145	64.849						

In the data table above, we can see that there are 7 factors influencing primary school students' problem-solving skills in the natural and social subject, which are set up by 31 questions with the initial eigenvalue greater than one. In other words, while 31 questions account for 61.704 percent of the factors influencing problem-solving abilities in primary school students' natural and social subjects, the remaining 38.296 percent is made up of other components. Factor 1 (32,039 percent), Factor 2 (7.917 percent), Factor 3 (5,256 percent), Factor 4 (4.6 percent), Factor 5 (4.44 percent), Factor 6 (3.92 percent), and Factor 7 (3.533 percent) are the percentages describing the affecting factors.

Table 5. Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
Q13	.772						
Q10	.691						
Q14	.685						
Q11	.685						
Q2	.668						
Q3	.592						
Q12	.587						
Q15	.560						
Q8	.518						
Q1	.499						
Q21	.414						

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Q30		.754				
Q29		.753				
Q31		.667				
Q27		.645				
Q5		.580				
Q28		.481				
Q18			.842			
Q16			.820			
Q17			.614			
Q22				.759		
Q24				.703		
Q26				.466		
Q23					.728	
Q25					.697	
Q6					.550	
Q19					.429	
Q9						.634
Q20						.630
Q4						.758
Q7						.668

b. Naming the factors

Table 6. Naming the factors

		Loading
Students' trust and efforts		
Q13	I believe that I can succeed with what I plan.	.772
Q10	I can achieve the goals that I have set.	.691
Q14	I will be able to successfully overcome many challenges.	.685
Q11	When faced with difficult tasks, I make sure to complete them.	.685
Q2	I like to answer difficult questions.	.668
Q3	I always find a way to answer difficult questions.	.592
Q12	I think I can achieve results that are important to me.	.587
Q15	I am confident that I can effectively perform a variety of tasks.	.560
Q8	I always review the content I have learned about nature and society.	.518
Q1	I always try my best in studying.	.499
Q21	During class, I always listen attentively.	.414
Attitude towards the subject		
Q30	I really enjoy studying natural and social subjects.	.754
Q29	I feel very confident when studying natural and social subjects.	.753
Q31	I always enjoy natural and social classes.	.667
Q27	The subject of nature and society is not difficult for me.	.645
Q5	I just like to study natural and social subjects.	.580
Q28	I am more willing to study nature and society than other subjects.	.481
Teachers' teaching skills		
Q18	The teacher taught me the lesson very well and easy to understand.	.842
Q16	The teacher gave examples for the exercises that I found very easy to understand.	.820
Q17	The teacher commented on my work very clearly.	.614

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Concentration		
Q22	When there is noise around, I still study well.	.759
Q24	There are not good lessons, I still study seriously and listen to the teacher's lesson fully.	.703
Q26	I often remember what the teacher taught.	.466
Perseverance		
Q23	When I was studying, sometimes I didn't listen to the teacher's lecture.	.728
Q25	I often forget what I have learned.	.697
Q6	I prefer to learn simple material; I dislike learning complicated material.	.550
Q19	When I make a mistake, I will be punished by the teacher.	.429
The need to communicate with the surroundings		
Q9	I'm always learning more about the world around me.	.634
Q20	Teachers often talk to me.	.630
The motivation for academic achievement		
Q4	I always want to receive compliments from teachers when studying.	.758
Q7	I always want to be successful in school.	.668

The load factor is a critical metric that assists instructors in prioritizing processing items. Variables having high load factors, especially those larger than 0.7, should be examined and processed early.

c. Discussion and limitation

The number of factors influencing the capacity to solve issues in natural and social disciplines is one of the study's most important discoveries. Seven variables were identified and explained 61.704 percent of the effect on elementary school students' problem-solving abilities. The data from the rotated component matrix table with 25 varimax rotations is quite valuable in both theory and practice. In theory, it offers more information on factors. The findings of this study can be used to comparable issues in the realm of education. However, caution must be taken because each object, area, and nation has unique qualities in terms of culture, politics, society, and economic situations. Some factors may apply to a wide range of places and nations, while others do not. In practice, educators may give management and direction measures based on identified factors, as well as identify instructional approaches and strategies that contribute to the development of problem-solving abilities in primary school students.

This study has the following limitations: The first constraint is associated to the analytical procedure. Exploratory factor analysis is a statistical tool for testing the structural validity and psychometric qualities of a group of measurements. However, EFA is not a powerful enough technique to evaluate the theoretical foundation, thus the CFA approach should be employed in future research to test the theoretical foundation (testing the set of measurements that our model recommended (seven components)). The second issue of this study is sample bias. The study team exclusively sampled students in the center of major cities in Vietnam since information was gathered mostly through zalo and Facebook, which has a significant impact on the generalizability of the research findings. Scholars and managers must use caution before adopting the findings of this study to their environment. The third drawback is that other factors are not taken into account in the study. Many crucial factors that directly impact instructors that have not been observed and assessed, such as facility and technological issues etc.

V. CONCLUSION

The purpose of this study is to discover the factors influencing primary school students' abilities to solve problems in natural and social curricula. The study team proposed 31 survey questions to be sent via social media to survey participants. The results of exploratory factor analysis, based on evidence from 250 valid answers, show that there are seven major factors influencing primary school students' ability to solve problems through the subject of nature and society, including: student trust and efforts; attitude toward the subject; teaching skills of teachers; concentration; perseverance; the need to communicate with the surroundings; and motivation for academic achievement. These findings can be used as references in future studies. Educators can use these findings to advocate for strategies that will provide a better education

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