IFSU Students Mathematical Problem-Solving Skill and Learning Styles

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ABSTRACT

The purpose of this paper was to describe the mathematical problem solving abilities and learning styles of sophomore students at Ifugao State University. The research evaluated the students' level of problem-solving skills. During the second semester of the school year 2016-2017, sophomore students from the university were given a 10-item problem in college algebra. Scores evaluated the level of mathematical problem-solving skills in this test. The findings showed that when clustered according to course, sex, and ethnolinguistic association, there was a substantial variation in the problem solving skills of respondents. There was an essential association between the respondents' learning style and problem-solving skills.

Keywords

problem-solving skills; learning pattern; word translation; enhancement, self-efficacy
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Introduction

Problem-solving, independent of discipline, has become one of the best teaching approaches as it develops students' critical reasoning skills. This includes logical thinking, solving skills, and the right method to be able to correctly answer a query.

If this is in written form, students, especially those in college, can easily address a given problem, even when the problem is in verbal form, where students need to decode the meat of the problem before executing a computation. With the given problem to solve, before finally executing an action and arriving at the correct answer, the student tends to translate the given mathematical sentence.

The essence of mathematics is problem-solving. It tests the amount of a logical thinker an individual is. Much recent problem-solving analysis is based on the process outlined by George Polya. His writings have been used for decades as a fundamental basis for many studies in problem solving mathematics (Ben-Hur, 2006). While textbooks can describe the function of Polya as a series of steps to be used to solve problems linearly, the procedure is versatile and fluid. The four components of the Polya method are knowing the problem (understand the problem), making a suggestion (proposing), carrying out the idea (carry out the plan), and looking back (look back).

Understanding the problem requires distinguishing required and unnecessary details, deciding what more information is needed, stating what is understood and what is unknown in the problem, understanding when calculations need to be made before other calculations are made, and rephrasing the problem as it helps to explain the purpose. Via dialogue, teachers should direct learners to explore these suggestions before seeking to solve the problem. Teachers should lead students to investigate the connection between the components of the dilemma.

Study results suggest that students frequently struggle to recognize the significance of knowing the dilemma and the potential to do so (Ben-Hur, 2006). One approach to help students learn these skills is, without a doubt, to raise a problem situation; then invite students to propose potential questions that suit the situation. Teachers need to cultivate an atmosphere where learners are safe asking questions; students are at risk of clarifying an issue. In general, if students fail to focus on and explain aspects of a dilemma before attempting to solve the question, they continue aimlessly.

When learning something different, the ability to solve math problems depends on the path a person takes. Under their learning patterns, the way people learn and interpret new knowledge is In certain areas where their academic style is more suited, this could be positive or nice. Not all learning types are suitable for any area of endeavor.

The attitude to learning by all is based on a confusing combination of abilities and interests.

And in various ways, at different times, we learn and apply new ideas, skills, and knowledge. Distinct products can be provided by various approaches to studying mathematics. The method varies from one person to the next.

What we learn, after all, depends a great deal on what we're learning. And our favorite methods of learning may not be the most helpful. Despite this, numerous scholars, psychologists, and educational authorities have attempted to characterize separate, intrinsic "learning styles." But there have been real questions about some of the more common models, especially the forms in which they have been implemented. There are also fears that the "labels" they create could potentially restrict the learning of individuals. In this study, we discuss how the learning approach influences the success of mathematics students.

The learning styles of students are correlated with their choice for how they obtain and process data. Honey and Mumford were the many models or hypotheses relevant to learning patterns used in this study (1992). The learning patterns Honey and Mumford have introduced are grouped into four. There are the protestors, the pragmatists, the philosophers, and the reflectors. While learning styles are unique to a person, when learning styles are explored by group categorizations, such as sex, first language, course, nationality, and age, certain themes appear. Identifying your desired learning style will make it easier to develop new skills and abilities. This study focused on the relationship between mathematical ability, modes of learning, and respondent demographic profile. For course improvement, the outcome of this research can be used.

Statement of the Problem

1. What are the students' learning styles?

2. What is the degree of the respondents' problem-solving ability?

3. When clustered according to course, is there a substantial gap in the problem-solving capability of respondents?

4. When clustered according to sex, is there a substantial gap in the problem-solving capability of respondents?

5. Is there a substantial association between the variables in the profile and the respondents' problem-solving ability?

6. Is there an essential connection between the respondents' learning style and problem-solving ability?

Hypotheses

1. When clustered according to course, there is no substantial variation in the problem-solving skill of respondents.

2. When classified according to sex, there is no essential variation in the problem-solving skill of respondents.

3. There is no essential relationship between the variables in the profile and the respondents' problem-solving abilities.

4. There is no important association between the learning style and the willingness of the respondents to solve problems.

Research Method

The descriptive research method used in this research was the descriptive analysis process, using the Learning Style Questionnaire (LSQ) and the Mathematical Problem-Solving Test (MPST) to be presented as the primary data collection instrument by the respondents. This was accompanied by the researcher's unstructured interviews and the real classroom experience. The results were focused on the understanding of the study of the collected data.

This research was performed during the 2018-2019 academic year at Ifugao State University. This was done through all of the university's campuses.

The students were selected from the sophomore students enrolled in courses needing board review. A total of 272 sophomore students acted as research participants. A profile of the respondents is reflected in Table 1.

Table 1. Respondents' Profile

Variable	*n*	*%*
Sex		
Male	85	31.25
Female	187	68.75
Ethnolinguistic Affiliation		

Ayangan	126	46.32
Ilocano	42	15.44
Kalanguya	13	4.78
Tuwali	91	33.46
Course		
BS Agriculture	37	13.60
BS Forestry	6	2.21
BS Psychology	14	5.15
BS Accountancy	11	4.04
BS Criminology	107	39.34
BSE	46	16.91
BEE	35	12.87
BS Civil Engineering	16	5.88

The researcher used two types of methods to gather data: the Learning Style Questionnaire (LSQ) adopted by Honey & Mumford (1992). While there are several various learning style models and systems, the researchers used Honey and Mumford (1986) forms of learning that are classified into four. Activists: Activists are those people who learn from doing something. Progressives must get their hands dirty. They have a receptive way of coping with studying, involving themselves in new experiences, absolutely and without inclination. The second classification is theorists. These students get a kick out of the ability to consider the hypothesis behind the events. To engage in the learning procedure, they need models, concepts, and truths for a particular end target. Like breaking down and combining, drawing new evidence into a 'hypothesis' that is methodical and reliable. The third classification is pragmatists. In their current reality, these people can perceive how to translate information into motion. Conceptual ideas and recreations are of little value until they may see an approach to putting the concepts in their lives functionally. It is their mode of operation to play with fresh theories, speculations, and approaches to verify if they work. By taking time to think about how to incorporate learning, case studies, problem solving, and conversation they learn more. The fourth classification is reflectors, by watching and analyzing what happened, these people learn. They can refrain from jumping in and prefer to watch from the sidelines. They want to sit back and see meetings from multiple alternative points of view, collecting evidence and taking the ability to move for an acceptable conclusion.

Most individuals typically adhere to one of the models, or switch between two depending on the situation, based on their observation. Each of these types comes with numerous instructional experiences that could be more suited for these particular learners.

The second questionnaire was the Mathematical Problem-Solving Test (MPST) prepared by the researcher, according to the Polya method. In the MPST, the durability test was hired. Permission from the deans of the respective colleges to conduct the questionnaire was sought. The researcher would first prescribe the LSQ and then, after a week, the MPST.

Data obtained from the respondents is compiled, graded, tabulated, and subjected to descriptive examination and findings interpretation. For the demographic profile of the subjects, the investigator used frequency and percentage. In assessing the learning style of the respondents, frequency and percentage were used. ANOVA was used to assess the significant impact on problem-solving capability, of course, and to assess the impact of sex on problem-solving ability, a t-test was used. The important relationship between problem-solving skill and profile variables and thus with the problem-solving capability of the respondents and learning styles was used by Pearson Moment Product Correlation (r) to assess.

Results And Discussions

Learning Styles

In terms of learning patterns, Table 2 indicates the distribution of the respondents. One hundred and thirty-three (133) participants are listed as reflectors, 68 are pragmatists, 52 are proponents and 19 are theorists. Types of learning activities as the choice of students for learning.

Table 2. Distribution of complete study according to their modes of learning

Learning Styles	*Frequency*	*Percentage*
Activists	52	19.12
Pragmatists	68	25.00
Reflectors	133	48.90
Theorists	19	6.99
Total	**272**	**100**

Issue Level-Solving Skill

The problem-solving skill level of respondents with an overall level of 30.86 is rewarding (satisfactory), as seen in Table 3. The result shows that because the perfect score is 50, the respondents are in average shape. This means that in mathematics, the respondents will answer worded questions at an average level.

Table 3: Level of problem solving-ability of respondents

Variable	*Mean Score*	*Description*
Mathematical Problem-Solving Test	30.86	Satisfactory

1-10: Poor; 11-20: Fair; 21-30: Satisfactory; 31-40: Very Satisfactory;41-50: Outstanding

When clustered according to course, the substantial variation in the problem-solving capability of respondents

As seen in Table 4, when respondents are clustered according to the course (F=4.870; p=0.000), there is a substantial gap in problem-solving performance. The outcome means that the respondents' mathematical skill varies according to courses. The BS Accountancy respondents had the highest mean score of 38.18, as seen in the table, led by BS Civil Engineering with an average score of 35.31 and BS Psychology with an average score of 35.18, while BS Agriculture had the lowest average score of 28.38. The outcome means that the course impacts the respondents' problem solving performance

Table 4. F-test result on the significant difference in problem solving ability when grouped by course

Course	*Mean*	*F-value*	*p-value*	*Remarks*
BS Agriculture	28.38	4.870	0.000**	Significant
BS Forestry	35.00			
BS Psychology	35.18			
BS Accountancy	38.18			
BS Criminology	28.71			
BSE	33.15			
BEE	30.26			
BS Civil Engineering	35.31			

The substantial variation in respondents' problem-solving abilities as clustered according to sex

There is a substantial disparity in the problem-solving capacity of the respondents as grouped by sex (t=-2.401; p=0.017), as can be gleaned from Table 5. The female respondents had an average score of 31.69, as seen in the table, which is higher than the average male score of 29.04. The mean alone suggests a major distance between males and females.

This suggests that sex has an important independent influence on students' problem-solving ability. When classified by sex, the second explanation, there is no difference in the problem solving capability of respondents, which is not a big gap.

This result is consistent with Hooda and Devi (2018), who stated that sex has a substantial influence on the problem solving potential of students in high schools to achieve mathematics. The outcome is in contrast to Ajai and Imoko (2015), who observed no substantial gap in the desire to solve issues for female and male high school learners. The same observation was found by Nouree & Sheikh (2016) that males and females perform very equally in the context of education grade VI in Pakistan. In the study, women do as well as men.

Table 5. Test of disparity in abilities to solve problems as respondents were divided by sex

Sex	*Mean*	*t-value*	*p-value*	*Remarks*
Male	29.04	-2.401	0.017	Significant
Female	31.69			

The important connection between profile variables and problem-solving capacity

Relationship between problem solving skills and profile variables are presented in Table 6. As shown in the table, there is a strong link between problem-solving capacity and race (r=0.145; p=0.017*) and problem-solving capacity and ethnolinguistic association (r=0.165; p=0.007*). There is, on the other hand, no important association between the ability to solve problems and the path (r=0.081; p=0.181).

The outcome means that the problem-solving capacity of the respondents is influenced by sex and ethnolinguistic association, although the course has little to do with the problem-solving capacity of the respondents. The female group has a higher problem-solving capability relative to the male group, depending on the results of this study. The Tuwali speaking respondents had the greater problem-solving potential in terms of ethnolinguistic affinity than the other classes.

In the Cruz & Bullecer (2016) study, they find that in the mathematical problem-solving test, language plays a role. Accordingly, if a student is fluent in a test that contradicts the language, most of the students have not met the average rate. The same analysis showed no major difference between the findings of the Fluent-Filipino and Fluent-English participants.

In this analysis, considering the course as a predictor, it was found to have no major impact on the respondents' problem-solving skills. The outcome is not consistent with the studies of Klegeris, McKeown, Hurren, Spielman, Stuart, and Bahniwal (2016), where the course has a substantial impact on the ability to address problems. During the beginning and end of the term, there have been major gaps in average scores from different classes earned by students. Their thesis is in contrast to Yusuf, Oseni, Adejoh (2016), where the course of study does not affect results but does greatly affect the degree of similarity. Regardless of the course of study to which he is accepted, as long as he/she has an interest, an engineering student can report a good score.

In the area of computer science, Balmes (2017) found that success is statistically important in math and programming classes. This outcome reinforces the idea that in approving students under the BSCS scheme, math grades should be a consideration to remember. The BSCS student-respondent success rating showed the importance of the math score and the programming course. This means that, because their programming ability is impaired, students pursuing computer science as a subject must be in mathematics.

Other profile factors, aside from sex and ethnolinguistic association, have a major influence on the problem-solving capacity that contributes to bad or successful academic results. In the study of Gupta, Kavita, and Pasrija, the role was found to have a significant influence on the problem solving ability of school students (2016). Therefore, students with good problem-solving capabilities have high academic success.

Table 6. t-test result on the association of profile and solving ability of respondents

	Profile Variable	***r-value***	***p-value***	***Remarks***
Problem Solving Ability	Sex	0.145	0.017	Significant
	Ethnolinguistic Affiliation	0.164	0.007	Significant
	Course	0.081	0.181	Not Significant

The significant relationship between learning styles and problem solving ability of students

The problem-solving ability and the learning style of respondents (r= 0.126 and p= 0.039) are strongly related, as seen in Table 7. The outcome means that the problem-solving skill is informed by the respondents' learning style. This outcome is related to the research of Bhat (2014) on the influence of learning styles on problem solving capacity among Jammu, India, high school learners in South Kashmir. The study's results found that the type of learning affected the problem-solving skill of high school students. In comparison, the outcome is consistent with the Aljaberi analysis (2015). Rahman and Ahman (2017) found that in mathematics there is no link between learning styles, races, and the correlation with learning success of learning styles with genders. This outcome is in comparison with the existing research. The outcome of Rahman and Ahman is confirmed by the analysis by Ahmad & Afthanorhan (2014) that there is no substantial variation in mathematics accomplishments between learning styles. The disparity in the style of learning between students does not influence mathematical achievements. There may, however, be other potential academic success predictors. The categories of students and other variables can be attributed to it.s

Table 7. Test of the relation between modes of learning and problem-solving skill of respondents

Variable	*r-value*	*p-value*	*Remarks*
Problem Solving Ability Learning Styles	0.126	0.039	Significant

Conclusions

The association between learning patterns and the willingness of students participating in board courses to solve mathematical problems has been explored. The mathematical problem-solving skill of students is greatly affected by learning styles. It ensures that students have the option to select the right style of learning to improve their power to solve word problems. Learners' success in a problem-solving mathematical exam was satisfactory. The outcome suggested that the problem-solving capability of the students was greatly impaired by sex and ethnolinguistic association. The outcome also suggests that the course would not change the success of mathematics students substantially. A good result would be noticeable as long as the student is involved, independent of the course of study where the student is accepted. The course of study is a personal option for students, but because some courses need a strong background in mathematics, deep interest and comprehension are needed.

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