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RESEARCH ARTICLE

Exploring Mathematics Metacognitive Knowledge among Preservice Teachers: Basis for Curricular Enhancement

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Abstract: In our research studies entitled "Assessing Mathematics Metacognitive Knowledge among Preservice Teacher," we gathered a total of 147 participants to partake in our research studies on Zamboanga Peninsula Polytechnic State University under the College of teacher education departments. Our variable has three subscales in metacognitive knowledge to ensure how they approach mathematics in their daily classes in the given subject.Cognitive/Metacognitive Strategies, CompetenceEnhancing Strategies, and Avoidance Strategies this subscale was used in the questionnaire through an online form like the platform of google application. We used various statistical tools to ensure the accuracy of the data given by the participants. During the survey results, we have 45 males and 102 females. Most participants in the study are 18-22 with 115 participants, while the least is between 33-37 with 3. At the year level, the one who contributed to our research study is 1st to 3rd year. 1st year has 35, 2nd has 61 and 3rd is 41 while the least is 4th is 10. The course category with the highest number of participants who partakes our research is BTVTED with a 46, while between the middle of the pact is BEED and BPED with participants of BEED is 34 and BPED is 31 while the least is BTLED with 17 participants. The highest mean level is the cognitive/metacognitive strategies with a 4.145, while the highest standard deviation is avoidance strategies with a 0.718. our correlation result has a moderate positive correlation, and the two tables have a negligible correlation. T-test results have one variable that rejects the null hypothesis and the other two variables that the null hypothesis is not rejected. Lastly, the development of the Analysis of variance between the Year level and course that all three variables have considered that the null hypothesis is not rejected.

Keywords: Mathematics, Metacognitive, Knowledge, Teachers, Curricular, Enhancement

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1.1 Introduction

Our research study focuses on Zamboanga Peninsula Polytechnic State University in the college of teacher education to comply with their metacognitive knowledge in mathematics by assessing among the preservice teacher. Studies on problem-solving behavior have generally been conducted on gifted students (e.g., Pativisan 2006), lower achievers (e.g., Teong 2003a), and young children(e.g., Desoete, Roeyers and Buysee 2001; Yeap 1998). these practices are often authentic in every student on how we cope with some mathematical issues, and every student has a different distinct trait. Most studies have dealt with paired or group problem-solving behavior (e.g., Artzt and Armour-Thomas 1992; Garofaloand Lester 1985; Goos, Galbraith, and Renshaw, 2002; Lester, Garofalo and Kroll 1989). Preservice teachers bring perspectives of, and beliefs about, mathematics teaching from their own schooling (Brown & Borko, 1992; Marks, 2007; Sherrf & Singer, 2012).

A person's attempts to obtain new information before he or she overcomes the tension created by the problem and searches for an explanation that is appropriate to the problem situation. Utilizing his or her mathematical abilities [19]. This process contributes to the students' mathematical skills by using these skills in daily life [48]. Problem solving is the process of interpreting a situation mathematically that usually engages several repetitive cycles of expressing, testing, and revising mathematical interpretation ([11], p. 782). Especially in mathematics in order for student progress and learning new information is too have a repetition of things in order for them to understands certain topic and assumable able to cope up the lesson. Any studies have promotes diverse skills such as communication, collaboration, mathematical problem- solving, and critical thinking. abilities to think (Daher, Anabousy, & Jabarin, 2018; Smith & Mancy, 2018). Every student is encountering different learning strategies in mathematics, Sometimes these strategies could be at fault or maybe the strategies are a success. Having knowledge about metacognitive processes and using these processes in effective and productive ways increases the metacognitive awareness levels of individuals (Marshall, 2003). In every mathematics subject as a student must find their own way of learning and able gain new information within the topic. According to Peña-Ayala and Cárdenas (2015), the simplest of human actions rely entirely on cognitive activity. The study of Naglieri and Johnson (2000) indicated that the provision of explicit metacognitive strategies can further enhance students' performance in mathematics – displaying the importance of planning to ensure effectiveness. Adding to this, Grizzle-Martin (2014) recommended the use of clear teaching that concentrates on cognitive and metacognitive strategies. If the teaching of mathematics is concise, clear, and easy to learn, students can probably quickly obtain new knowledge and understand every lesson the teacher delivers.

The transition from preservice to inservice is not always smooth. Studies have focused on preservice mathematics teachers' beliefs, conceptions, and perspectives (Brown & Borko, 1992; Bush, 1986; Cooney, Shealy, & Arvold, 1998; Sandholtz, 2011). They have found that teachers have been impacted significantly by their experiences with mathematics and schooling long before they enter teacher preparation programs. Kilic (2014).

1.2 Conceptual Framework

According to Flavell et al. (2002), metacognitive knowledge about memory includes explicit, conscious, and factual knowledge about the importance of a person, task, and strategy variables for memorizing and recalling information. This research study will make us understand how they approach mathematics subjects and evaluate their mathematics ability. Other research points to the difficulty preservice teachers often have integrating what they learned in their teacher preparation program with what they experience in schools (Cavanagh & Prescott, 2007; Hine, 2015). And,

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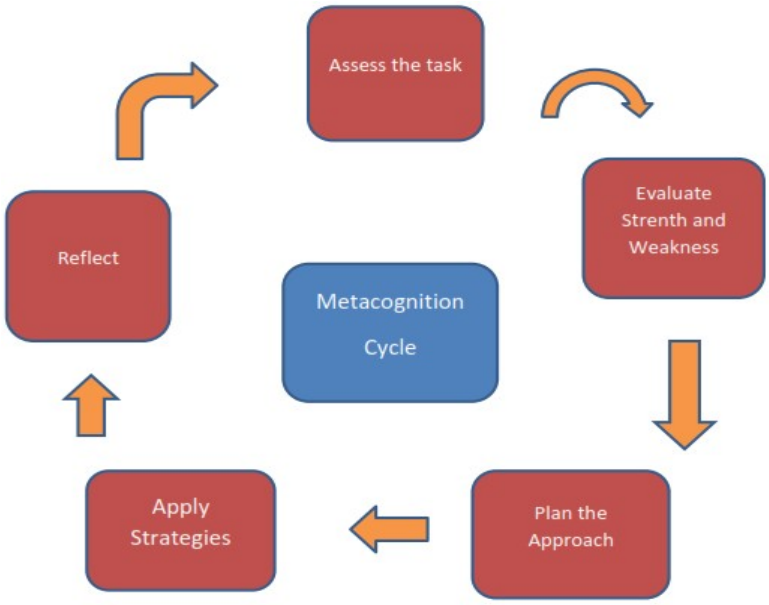
even though preservice teachers are regularly exposed to progressive pedagogical approaches, they nevertheless often shift to more traditional teaching practices as they move into the practicum and begin their teaching career(Marks, 2007)

This section covers the review of related studies and literature and presentation of the conceptual model



1.3 Statement of the Problem

This study seeks to determine the metacognitive knowledge of strategies in mathematics among the preservice teacher of College of Teacher Education of Zamboanga Peninsula State University Specifically,this study seek to answer the following questions

- What is the profile of the preservice teachers of the College of Teacher Education of Zamboanga Peninsula Polytechnic State University

  a) Sex b) Age, c) Course and Major, d) Year Level

- What is the level of Metacognitive Knowledge of Strategies of the preservice teacher in mathematics in terms of

  a) Cognitive/Metacognitive Strategies b) Competence-Enhancing Strategies c) Avoidance Strategies

- Is there a significant relationship between the metacognitive knowledge in Math among preservice teachers?
- Is there a significant difference in the Metacognitive Knowledge of Strategies the preservice teachers in

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Mathematics when grouped according to:

a) Sex b) Course and Major c) Year Level

The findings of the study will benefit to

Dean.This research study provide the information that can help the institution towards their approach in mathematics.
Teacher. This research study will help the teacher to maximize their learning strategy in mathematics.
Student. This research study will help the student to develop their metacognitive knowledge in mathematics

1.4 Scope and Limitation

This study will be conducted with a Pre-service teacher of Zamboanga Peninsula State University through assessing their Metacognitive knowledge in mathematics. This study focuses on their approach towards learning mathematics and how they handle it on a daily basis in mathematics classes

2.1 Methodology

2.2 Research Design

The research design we used is our research is a quantitative design cross-sectional survey. Cross-sectional surveys are observational surveys conducted in situations where the researcher intends to collect data from a sample of the target population at a given point in time. Researchers can evaluate various variables at a particular time. Cross-sectional studies take a cross-section of the people and study a phenomenon, situation, or event under consideration. These studies aim to investigate the case in the present, and these studies do not aim at studying the change and the factors causing change. Cross-sectional studies are observational in nature and are referred to as descriptive research rather than causal or relational research, which means they cannot be used to establish the origin of an illness. Researchers take notes on the information in a population, but they don't play with the variables (Cherry 2019)

Cross-sectional studies are retrospective studies that look at data from a group of people at one point in time. They are often used to assess the prevalence of health outcomes, comprehend health determinants, and identify population characteristics. Cross-sectional studies, unlike other forms of retrospective studies, do not monitor individuals over time. {Wang & Cheng 2020}. It will be conducted through a google form due to the schools' health protocols due to the Covid-19 Pandemic. It will be collected through the internet because we can't follow the standard procedure due to our situation.

2.3 Population and Sample

The population that we are conducting is in the Zamboanga Peninsula Polytechnic State University within the College of Teacher Education. To be followed by our student through 1st year and 4th year preservice teacher.

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Course in CTE	First Year	Second Year	Third Year	Fourth Year	Total
BEED	75	88	60	42	265
BSED-MATH	41	41	34	0	116
BPED/BSED MAPEH	45	82	89	37	253
BTVTED/BTTE	125	86	79	5	295
BTLED/BSED-TLE	66	58	50	32	206
Total	352	355	312	116	1135

Sampling Procedure

Stratified Sampling/Systematic Sampling

Course in CTE	N	%	n
BEED	265	23.35	47
BSED-MATH	116	10.22	20
BPED/BSED MAPEH	253	22.29	45
BTVTED/BTTE	295	25.99	52
BTLED/BSED-TLE	206	18.15	36
Total	1135	100	200

2.4 Research Instruments

The research shall adopt existing literature through our survey questionnaire that will be done at the meets of the study. The survey questionnaire will be organized into three subscales to measure the pre- service teacher's ability in math during the metacognitive experience. All these questionnaires are from a metacognitive strategy. A person gains metacognitive knowledge and learns about the learning unit and the best design for it through metacognitive experiences. The basic concepts, beliefs, and empirical research designing an instrument to quantify processes that characterize psychological and social phenomena are outlined in A Technique for Attitude Measurement (Likert, 1932). wonders of social and psychological nature (Likert, 1932).

A Likert scale is made up of statements that specify and explain the context and significance of the construct being calculated. The scale's statements reflect a belief, preference, decision, or opinion. The statements are put together to form a single- dimensional construct (Babbie, 1999; McIver & Carmines, 1981). Each statement's answer spectrum is a linear scale that indicates how often respondents agree or disagree with each statement. For statements favorable to the construct, a generic answer spectrum is 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided or Neutral, 4 = Agree, and 5 = Strongly Agree.

The focus of the article is on the consistency of test scores obtained from a Likert-type scale. Proof researchers present in journal papers documenting the validity of test scores, including a summary of item-generating strategies

to determine the material, is also relevant but not discussed in the article. Face validity, expert assessments attesting to criterion and construct validity, and scientific proof attesting to standard and construct validity (Nunnally & Bernstein, 1994, Chapter 3). The article's research is based on the following principles: (a) measurement reliability is a property of the test scores obtained from the instrument of measurement and (b) according to study reporting guidelines, writers must cite reliability coefficients for test scores that are recorded and interpreted (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999; Wilkinson & The Task Force on Statistical Inference, 1999).

The accuracy of measurement is referred to as reliability. The reliability of a test score that quantifies psychological and social constructs is derived from classical test theory and states that an individual's accurate score is made up of an observed (measured) score minus random errors of measurement, as expressed by the equation below (Cronbach, 1984).

The validity of our divided subcale questionnaire in the Cronbach alpha is Metacognitive Knowledge of Strategies {Cognitive/Metacognitive Strategies} 0.720177,{Competence-Enhancing Strategies} 0.771692 and {Avoidance Strategies} 0.778818

2.5 Data Gathering Procedures

The researcher seeks approval from our respected research teacher to aboard the survey questionnaire using Google Forms and check the survey questionnaire if there is an error during the making of the questionnaire in the Zamboanga Polytechnic State University. To pursue or conduct a survey, we must have a letter throughout all courses in the College of Teacher Education Department to seek a letter of approval from the Dean so that we can have a result throughout our investigation of our respective research.

To commence Data collection with our respective courses that it must be validated and approved by the Dean. Since we are in a pandemic situation, Data collection will be taken in a Google Form. The researcher will assign a particular person who will monitor the google form from every course of the CTE department of ZPPSU. The researcher will explain the study's importance and gain a benefit after answering a questionnaire solely to ask their active participation in this study. The participants will forward an invitation with a link by the researcher to our instructor or students.

Chapter 4

3.1 Result and Discussion

Our study result came from a respondent in Zamboanga Peninsula Polytechnic State College using a cross-sectional survey due to the pandemic situation. We deliver the survey form through the use of online with the platform of google form application. Stratified sampling is our basis for handling the respondent within the College of Teacher education in Zamboanga Peninsula Polytechnic State College

Research Problem 1: What is the profile of the respondents in terms of Sex, Age, Course and Year Level?

Table 1 Frequency Distribution of Respondents in terms of Sex and Age

Variable	f	%
Sex		
Male	45	3
Female	102	6
Total	147	1
Age		
18 — 22	115	7
23 — 27	25	1
28 — 32	4	2
33 — 37	3	2

Our overall participants are over 147 students within the College of teacher education while finding a respondent using stratified sampling. Most are respondents came from the female, with 102 respondents and 45 for male. and while in the age group our respondent mostly came from an 18 to 22-year-old category with a 115 out of it while the least came from the sort of 33-37 years old with three respondents.

Table 2 Frequency Distribution of Respondents in terms of Year Level

Year Level	f	%
First	35	2
Second	61	4
Third	41	2
Fourth	10	6

The distribution of year level our respondent mostly came from the second year with a 61 while the least is the fourth year with 10

Table 3
Frequency Distribution of Respondents in terms of Course

Course	f	%
BEED	34	23
BSED-MATH	19	12
BPED	31	21
BTVTED	46	3
BTLED	17	11

The distribution of the course level is the BTVTED has the most respondent with 46 respondents while the least is in the BTLED has 17 respondents.

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Research Problem 2: What is the level of Metacognitive Knowledge of Strategies of the preservice teacher in mathematics in terms of

- Cognitive/Metacognitive Strategies
- Competence-Enhancing Strategies
- Avoidance Strategies

Table 1: Level of Cognitive/Metacognitive Strategies

Statements	(5)	(4)	(3)	(2)	(1)	(5) + (4)	(3)	(2) + (1)
1.When i am reading a mathematical problem I am thinking whether there are various ways of solving it.	40	90	16	1	0	130	16	1
2.I pay attention to the words in the phrasing of the problem in order to figure out what is required so that I solved it. {e.g., the word and means addition}	44	87	16	0	0	131	16	0
3.When I do not understand something i am asking my teacher to explain it to me so that I can go on on my own.	57	63	24	2	1	120	24	3
4.When I have solved a mathematical problem I am checking if I did the computations correctly.	65	67	14	1	0	132	14	1
5.When I find the mathematical problem complicated I am thinking the various pieces of it separately and in which sequence to put them in order to solve it .	33	80	33	0	1	113	33	1
6.When I finish the solution of a mathematical problem I read the problem again and check if I did the operations in the order they should be done.	53	75	16	2	1	128	16	3
7.When I finish the solution of a mathematical problem I evaluate the outcome if it is in accordance with what the problem required.	37	71	38	1	0	108	38	1
8.When a mathematical problem is complex I am thinking it advance the operations that need to be done and in which sequence.	24	79	42	2	0	103	42	2
9.When I have a difficult problem to solve i am reading it many times in order to understand what the problem requires.	74	59	12	1	1	133	12	2
10.As I do computations to solve a mathematical problem I monitor myself to check whether I did them correctly so that I make corrections if needed.	48	80	19	0	0	128	19	0

In the subscale questionnaire of metacognitive strategies, mostly the ten questions answered between strongly agree and agree.

Table 2: Level of Competence-Enhancing Strategies

Statements	(5)	(4)	(3)	(2)	(1)	(5) + (4)	(3)	(2) + (1)
1.When I learn something new in mathematics i am checking how it is connected to previous lessons.	34	74	36	3	0	118	36	3
2.When i learn something new in mathematics I am trying to compare it with other similar concepts also in mathematics {e.g. what is the difference between addition of integers and addition of decimals}.	33	69	41	4	0	102	41	4
3.I am playing mathematical games in magazines or in the computer.	20	46	63	16	2	66	63	18
4.When I solve mathematical problems I am thinking of other similar ones from everyday life.	22	72	48	5	0	94	48	5
5.I like to create mathematical exercises for myself and figure out how to solve them.	16	50	66	15	0	66	66	15

Legend: Strongly Disagree (1); Disagree (2); Neutral (3); Agree (4); Strongly Agree (5)

In the subscale questionnaire of Competence-enhancing strategies, primarily the five questions answered between strongly agree and agree.

Table 3: Level of Avoidance Strategies

Statements	(5)	(4)	(3)	(2)	(1)	(5) + (4)	(3)	(2) + (1)
1.When I have mathematical exercises to do and I can find somewhere the solutions readymade I am copying it.	14	47	61	23	2	61	61	25
2.I am solving the exercises I can and I leave out the rest.	15	51	55	22	4	66	55	26
3.When the mathematical problem is difficult I give up.	16	22	51	42	16	38	51	58
4.When I solve a mathematical problem that I do not understand I am checking how my fellow students solve it.	65	67	14	1	0	132	14	1
5.When I am solving a mathematical problem I do all the operation I can and then I stop even if I have not found the solution.	20	53	42	25	7	73	42	32
6.When I do not understand what the mathematical problem requires I give up	14	31	37	47	18	45	37	65

Legend: Strongly Disagree (1); Disagree (2); Neutral (3); Agree (4); Strongly Agree (5)

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The subscale questionnaire of avoidance strategies in the category of strongly agree and agree and has a 132 is in question 4, while the other question is in the balance subscale of questioning due to the fact of different courses. Check & Schutt (2012) describe survey research as "the collecting of information from a sample of persons through their replies to questions" (p. 160). In addition to valid and trustworthy research tools, questionnaires may incorporate demographic questions (Costanzo, Stawski, Ryff, Coe, & Almeida, 2012; DuBenske et al., 2014; Ponto, Ellington, Mellon, & Beck, 2010).

Table 5: Metacognitive Knowledge Strategies Subscale

Metacognitive Knowledge of Strategies	Mean	SD
Cognitive/Metacognitive Strategies	4.145	0.468
Competence-Enhancing Strategies	3.699	0.597
Avoidance Strategies	3.281	0.718
Overall	3.7083	0.5943

The result indicates that the overall mean between the three subscale is 3.7083 and the standard deviation is 0.5943. The root of the variance is used to calculate the standard deviation, which is a data point that quantifies the dispersion of a dataset compared to its mean. There is a better deviation among the data set if the data points are above the mean; hence, the more open the data, the higher the quality deviation. (Ben 2021). A big standard deviation isn't always a bad thing when you're merely observing and recording data; it just means there's a lot of variety in the group you're studying. (Rumsey)

Research Problem 3: Is there a significant relationship between the metacognitive knowledge in Math among preservice teachers?

Table No.1
Pearson - r Correlation Coefficient and Coefficient of Determination between Metacognitive Strategies and Competence-Enhancing Strategies

Pearson - r Coefficient	Coefficient of Determination	Interpretation
0.613	0.76	Moderate Positive Correlation

Legend: ^{s} Significant at alpha = .05 level.

The table above indicates that there is a Moderate significant positive correlation between Metacognitive Strategies and Competence-Enhancing Strategies of the college students in the control group, with a correlation coefficient of 0.613.Which means there is a tendency for high x variable scores that goes with a high Y variables

scores.

Table No.2
Pearson - r Correlation Coefficient and Coefficient of Determination between Competence- Enhancing Strategy and Avoidance Strategy

Pearson - r Coefficient	Coefficient of Determination	Interpretation
0.129	0.017	Negligible Correlation

Legend: ^{s} Significant at alpha = .05 level.

The table above indicates that there is a Neligible correlation between Competence-Enhancing Strategy and Avoidance Strategies of the college students in the control group, with a correlation coefficient of 0.129. Which means there is a tendency for low x variable scores that goes with a low Y variables scores

Table No.3
Pearson - r Correlation Coefficient and Coefficient of Determination between Metacognitive/Cognitive Strategies and Avoidance Strategy

Pearson - r Coefficient	Coefficient of Determination	Interpretation
0.031	0.001	Negligible Correlation

Legend: ^{s} Significant at alpha = .05 level

The table above indicates that there is a Neligible correlation between Metacognitive/Cognitive Strategy and Avoidance Strategies of the college students in the control group, with a correlation coefficient of 0.031. Which means there is a tendency for low x variable scores that goes with a low Y variables scores.

The correlation coefficient indicates how closely the data in a scatterplot follow a straight line. The data set will then be completely aligned. There is little to no straight- line connection in data sets with r values close to zero. (Taylor 2020)

Research Problem 4: Is there a significant difference in the Metacognitive Knowledge of Strategies the preservice teachers in Mathematics when grouped according to: sex, , course and year level?

- Sex

Table No.1
Independent t-test Result of Metacognitive Strategies in terms of Sex

Sex	***Mean***	***SD***	***Mean Difference***	***t — value (df = 68)***	***p value***	***Decision on Ho***
Female	4.22	.416	0.24	1.995	0.0376	Rejected
Male	3.98	.536				

Note: ^{ns} p value is greater than alpha = .05.

In terms of Sex, the table reveals that the null hypothesis which states, "There is a significant difference in the of Metacognitive Strategy of the respondents when data are group according to sex", is rejected. This indicates that the Metacognitive Strategy of the respondents does is a significantly differ when they are grouped according sex.

Table No.2
Independent t-test Result of Competence-Enhancing Strategies in terms of Sex

Sex	***Mean***	***SD***	***Mean Difference***	***t — value (df = 70)***	***p value***	***Decision on Ho***
Female	3.75	.553	0.16	1.994	0.0939	Not Rejected
Male	3.59	.679				

Note: ^{ns} p value is greater than alpha = .05.

In terms of Sex, the table reveals that the null hypothesis which states, "There is no significant difference in the of Competence-Enhancing Strategy of the respondents when data are group according to sex", is not rejected. This indicates that the Competence-Enhancing Strategy of the respondents does not significantly differ when they are grouped according sex.

Table
No.3
Independent t-test Result of Avoidance Strategies in terms of Sex

Sex	***Mean***	***SD***	***Mean Difference***	***t — value (df = 87)***	***p value***	***Decision on Ho***
Female	3.27	.73	-0.43	1.987	0.7641	Not Rejected
Male	3.31	.70				

Note: ^{ns} p value is greater than alpha = .05.

In terms of Sex, the table reveals that the null hypothesis which states, "There is no significant difference in the of Avoidance Strategy of the respondents when data are group according to sex", is not rejected. This indicates that the Avoidance Strategy of the respondents does not significantly differ when they are grouped according sex.

A t-test is an inferential statistic that is used to see if there is a significant difference between the means of two groups that are similar in some ways. (2020 Hayes)

- Year Level

Table No.1
ANOVA Result of the of Metacognitive Strategies in terms of Year Level

Source of Variation	Sum of Squares	df	Mean Square	F value	p value	Interpretation
Between Groups	1.263	3	0.421	1.96	0.123	Ho is NOT rejected
Within Groups	30.721	143	0.215			
Total	31.984	146	0.219			

Note: Significant at alpha = .05; Null hypothesis is NOT rejected.

Sample Table in Case Ho is Rejected

Table No.2
ANOVA Result of the of Competence-Enhancing Strategy in terms of Year Level

Source of Variation	Sum of Squares	df	Mean Square	F value	p value	Interpretation
Between Groups	1.407	3	0.469	1.327	0.268	Ho is not rejected
Within Groups	50.543	143	0.353			
Total	51.95	146	0.355			

Note: Significant at alpha = .05; Null hypothesis is rejected.

Table No.3
ANOVA Result of the of Avoidance Strategy in terms of Year Level

Source of Variation	Sum of Squares	df	Mean Square	F value	p value	Interpretation
Between Groups	0.691	3	0.230	0.442	0.724	Ho is not rejected
Within Groups	74.58	143	0.512			
Total	74.721	146	0.516			

Note: Significant at alpha = .05; Null hypothesis is rejected.

Course

Table No.1
ANOVA Result of the of Metacognitive Strategy in terms of Course

Source of Variation	Sum of Squares	df	Mean Square	F value	p value	Interpretation
Between Groups	0.823	4	0.206	0.937	0.444	Ho is not rejected
Within Groups	30.458	142	0.219			
Total	31.281	146	0.219			

Note: Significant at alpha = .05; Null hypothesis is rejected.

Table No.2
ANOVA Result of the of Competence-Enhance Strategy in terms of Course

Source of Variation	Sum of Squares	df	Mean Square	F value	p value	Interpretation
Between Groups	0.665	4	0.166	0.461	0.765	Ho is not rejected
Within Groups	51.285	142	0.361			
Total	51.95	146	0.356			

Note: Significant at alpha = .05; Null hypothesis is rejected.

Table No.3
ANOVA Result of the of Avoidance Strategy in terms of Course

Source of Variation	Sum of Squares	df	Mean Square	F value	p value	Interpretation
Between Groups	0.493	4	0.123	0.233	0.919	Ho is not rejected
Within Groups	74.77	142	0.527			
Total	75.263	146	0.516			

Note: Significant at alpha = .05; Null hypothesis is rejected.

Statistical analysis is a numerical method for determining probabilities between collections of data or data findings. Data from the natural or social sciences can be used. Statistical analysis helps elaborate on trends or patterns found within the research of a topic. (Fitzpatrick, 2019), A researcher must show where his data comes from. Critics

might assess whether the statistical analysis uses inaccurately measured data to tailor the data to the study. (Fitzpatrick, 2019). Use an ANOVA test or another evaluative means test. An ANOVA test, also known as an analysis of variance test, ensures that averages exist within each variable test group. If this is the case, the statistical analyses' sample sizes may be wrong. (Fitzpatrick, 2019).

4.1 Conclusion

This chapter presents our general findings in the three subscales of metacognitive process in assessing mathematics among preservice teachers. Our method of taking participants through a cross-sectional survey due to the pandemic outbreak situation followed health protocols among our participants. With the institution's population, the research instrument that we preferred is the stratified sampling by telling the group member to gather participants in every course by doing a point person in search of our participants. This study aims to know the capability of the preservice teacher in mathematics on how they will assess their metacognitive knowledge in this given subject. Our approach is a quantitative approach to see the result of our studies during the tenure of the survey. And we use various statistical tools to have accurate results in our research studies. The statistical method that fits the problem statement is a descriptive statistic, correlation, T-test, ANOVA, and Cronbach alpha during the procedural process of our research in the institution.

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