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Level of Use of Mathematical Problem Solving Strategies among Kanowit District Primary School Teachers

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***Abstract*: The purpose of this study was to identify the level of use of mathematical problem solving strategies among primary school teachers in the Kanowit district. The researchers carried out survey research design to determine their problem solving strategies. Stratified sampling technique and simple random sampling were used to select 97 of the 130 mathematics teachers. The survey questionnaire was used to gather data. This study used quantitative type of research and the data collected was analyzed descriptively and inductively using the software version 25 of the Statistical Package for Social Sciences (SPSS). Findings revealed that the overall mean score obtained for the level of use of mathematical problem solving strategies among primary school teachers was 4.10. Based on the two sample independent t-test, there are 9 different types of mathematical problem solving strategies that show no significant difference in the level of strategies used between male and female mathematics teachers. The results of the study also suggest that there were no significant mean differences in the level of use of mathematical problem solving strategies between novice and experienced teachers.**

***Keywords*: Mathematics, Primary School Teachers, Problem Solving, Strategies.**

I. INTRODUCTION

A great deal of attention has been paid to mathematical problem solving in the context of education in recent days. Problem solving must be the primary goal of teaching and learning mathematics, giving each learner an opportunity to engage in problem solving activities (Nieuwoudt 2015). According to Gurat (2014), the main goal in teaching mathematical problem solving is for the students to develop a generic ability in solving real life problems and to apply mathematics in real life situations.

Problem solving is a matter of mathematical terms (words) and statements (sentences) arranged in the form of stories. These questions require a student to have the skills to read, process information, detect keywords and determine the operation that is appropriate to the question. Hence, to solve the problem solving questions, various strategies or techniques such as diagrams, Bar Models, sketches may be used to interpret the information in question (Fhatin Nurnaqibah & Rosadah 2018).

Mathematical problems are divided into routine problems and non-routine problems. While routine problems are problems that can be easily addressed using four basic operations and some rules, non-routine issues demand a higher level of thinking and a greater ability for students to analyze events and look for relationships, order or trends (Ünlü 2018). Given that non-routine problems require unpredictable and unknown solutions, students usually fear the concept of solving non-routine problems.

Using the relevant mathematical problem solving strategy is one of the ways in which mathematics teachers will use it to help students solve mathematics problems they encounter. Some of the strategies used in past studies are Graphic Drawing, CUBES, Visualization Strategies, Bar Model, Cooperative Learning, Pattern Finding, Working Backward etc.

Although the website provides many different types of mathematical problem solving strategies, researchers want to learn how much other mathematics teachers are aware of and apply new strategies. The exposure of these types of strategies is very helpful for teachers to help their students improve their problem solving skills.

Though the different strategies were accessible and readily available through the internet resources, to what degree are the actions and expectations of the teacher to implement the different strategies applicable to the problems encountered in the teaching and learning process. As such, this study not only takes the opportunity to discuss the various types of problem solving strategies, but also aims at focusing on the primary school teachers' level of use of problem solving strategies.

Not only that, the researchers also want to know the difference between the mean level of use of the mathematical problem solving strategy between the male and female mathematics teacher, and the mean difference through this study between the novice and experienced teacher. The research questions are as follow: 1) What is the level of mathematical problem solving strategies use among primary school teachers in the Kanowit district? 2) Is there a significant difference between male and female teachers in Kanowit district in the use of mathematical problem solving strategies? 3) Is there a significant difference between novice and experienced teachers in the Kanowit district in the level of use of the mathematics problem solving strategies?

II. LITERATURE REVIEW

Khiyarusoleh and M.Pd (2016) stated that the word cognitive is derived from the words cognition, meaning knowing. According to the cognitive theory of Jean Piaget, cognitive development of a person will take place in four different stages at different ages, namely sensory motor levels (0-2 years), preoperative levels (2-7 years), concrete operational levels (7-11 years) and formal operational levels (11 years and above).

Concrete operations are cognitive developmental stages that occur in primary school students. At this stage, students are using physical objects to create more logical thinking. Students will still face difficulties if they do not have physical objects to help them solve problems or tasks (Ibda, 2015).

Teaching is a process involving the transmission of information to a specific target (Mahmood, 2012). Syed Ali et al. (2018) stated that teaching methods are actions taken by teachers to manage the teaching and learning process. According to Baba (2009) and Safinas et al. (2001), the effectiveness of the teaching strategy used can influence student achievement. By referring to previous studies, most of the strategies used in this study were to test the effectiveness of these strategies in improving the skills of students and their achievement in solving mathematical problems. For example, Bar Model (Ji Lin & Siti Rahaimah Ali 2018) is a strategy that requires a student to use the information in a mathematical question to construct a bar-shaped diagram to help students understand the question. According to Ariffin and Hj. Azid @ Aziz (2016), The Bar Model Strategy works to represent the definite and indefinite quantities and relationship between them.

This study was also guided by the CUBES (Siew Ha & Rosli 2017) and the Graphic Strategy (Arihasnisa et al. 2010). In the CUBES, 'C' requires pupils to circle numbers in questions, 'U' requires students to outline the question, 'B' keywords, 'E' evaluates to identify mathematical operations required and 'S' requires students to calculate and revise answers. Drawing Strategy (Fhatin Nurnaqibah & Rosadah 2018) and Visualization Technique (Station 2016) are the process of making a sketch, drawing or illustration that needs a student to be able to read mathematics first and thus transform important information into visual images that are easier to understand. Such visual images allow students to redefine the requirements of the problem by using their own vocabulary and understanding (Arihasnisa et al. 2010).

Cooperative Learning is a learning process that involves discussing, exchanging or sharing ideas within a group to solve a problem. Peer Tutoring Strategy was introduced by Gan and Hong (2010). Peer Tutoring Strategy is a paired learning process, one of which guides and instructs its partner (Carr et al., 2016). The Game Strategy (Muhamad et al. 2018) can be used as an alternative to enhance student critical thinking and creativity. This is because students' commitment to the objectives of the game will encourage them to use various means to win the game (Muhamad et al., 2018).

Storytelling is one of the strategies that teachers can use to connect informal students' knowledge and experience with more formal mathematics problems (Lemonidis & Kaiafa, 2019). Finding a Pattern, Guess and Check, Adopting a Different Point of View, Working Backwards, Making a Drawing, Organizing Data and Accounting for All Possibilities are all strategies that Taspinar & Bulut (2012) has been exposed to through the study. The types of strategies used by the study sample prior to exposure were very limited in this study. However, the findings of the study have shown that students can apply these types of strategies and can help them solve mathematical problems. This situation has shown that various strategies for solving mathematical problems have been implemented and that the effectiveness of these methods has also been examined.

Since the aim of these studies is to test the effectiveness of the strategies used, the type of the research design is more suited to action research, quasi-experimental and case studies. For example, studies on Bar Model Strategy (Ji Lin & Siti Rahaimah Ali 2018), CUBES Strategy (Siew Ha & Rosli 2017), Drawing Strategy (Fhatin Nurnaqibah & Rosadah 2018) and Visualization Technique (Station 2016) were conducted through action research.

In the meantime, Diagram Strategy (Arihasnisa et al, 2010), Handed Cooperative Learning (Demitra & Sarjoko 2018), Peer Tutoring (Gan & Hong 2010), Game Strategy (Muhamad et al. 2018), and Storytelling Strategy (Lemonidis & Kaiafa 2019) have been conducted through quasi-experimental studies. In addition, the Bar Model Strategy conducted by Ariffin & Hj. Azid @ Aziz (2016) and Cooperative Learning Strategy (Nieuwoudt, 2015) have been implemented through a case study. By referring to the reasoning described, researchers would like to suggest the four hypotheses:

H_o : There are no significant differences in the level of use of the problem solving strategies between male and female mathematics teachers in the Kanowit district.

H_a : There is a significant difference in the level of use of the problem solving strategies between male and female mathematics teachers in the Kanowit district.

H_o : There are no significant differences in the level of use of the problem solving strategies between novice and experienced mathematics teachers in the Kanowit district.

H_a : There is a significant difference in the level of use of the problem solving strategies between novice and experienced mathematics teachers in the Kanowit district.

III. RESEARCH DESIGN

According to Mahmood (2012), the design of the study is the route and guide for the researcher to carry out the study. This study is a quantitative survey using the method of the questionnaire. The survey research method was selected because the sample size of the study was large. The results of this survey can be accurately generalized to the population (Yan Piaw, 2006). The findings of the questionnaire were descriptive and inductive.

RESEARCH INSTRUMENTS

The sample of this study involved primary school mathematics teachers in the Kanowit district. There are 25 National Schools (Sekolah Kebangsaan, SK) and 10 National-type Schools (Chinese) (Sekolah Jenis Kebangsaan Cina, SJKC) in the Kanowit district. The teaching population of the National School (SK) is 400, while the National-type School (Chinese) is 123. After reference to SISC+ Mathematics at the Kanowit district Education Office, the number of mathematics teachers in Kanowit district Primary Schools is approximately 130. According to the Krejcie and Morgan (1970) sample size determination table, there are 97 sample studies to be chosen from 130 mathematics teachers. Stratified sampling technique and simple random sampling are easy to use in this study to collect relevant data. Stratified sampling technique has been chosen because researchers need to divide the population by gender, experienced and novice teachers. After dividing the population by the categories listed, a simple random sampling technique will be used to select a sample survey so that the selected study sample can represent the population of mathematics teachers in the Kanowit district.

The research instrument used in this study was a survey questionnaire. The researchers referred to Mahmood's (2012) PhD Thesis questionnaire from the University of Malaysia. Mahmood (2012) has used this survey questionnaire in the study of 'Use of Arabic Language Teaching Methods Among Primary School Teachers'. By referring to the survey questionnaire form, the researchers have adapted the items to this study.

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In order to collect the data needed for this study, the survey questionnaire given consisted of two parts. The first section needs respondents to fill in their details such as school type, gender, age, major specialization, minor specialization, years of teaching, years of teaching as a mathematics teacher, the number of courses / trainings / workshops attended during the year and the interest of the respondents in teaching mathematics. In the second part, the respondents had to fill out the level of use of the strategy on the basis of the Likert Scale indicated. There are 11 types of strategies listed in this section. The survey questionnaire also provided an opportunity for respondents to list the strategies of solution previously used but not included in this study. Although the items in this questionnaire were adapted and modified from the questionnaire 'Use of Arabic Language Teaching Methods in Primary School Teachers (University of Malaya PhD Thesis)', the researchers also increased the validity and reliability of the questionnaire items by referring to Mathematics experts. The mathematician referred to is Dr. Hu Laey Nee, a mathematics lecturer currently working at the Institute of Teachers Education Sarawak Campus. In order to facilitate Dr. Hu's feedback on the questionnaire, the researchers also created a notice room to allow her to comment and to make some improvement on the questionnaire.

IV. DATA ANALYSIS

After 3 weeks of data collection, researchers received 97 google forms from mathematics teachers in Kanowit district. In answer to the research questions, the researchers described the gender and experience of the respondents in teaching mathematics as shown in Table 1 and Table 2.

Table (1): Distribution of respondents by gender

Gender	Number	Percentage (%)
Male	46	47.40
Female	51	52.60
Total	97	100.00

Table (2): Distribution of respondents by teaching experience

Teaching Experience	Years of Teaching	Number	Percentage (%)
Novice	< 5 years	57	58.80
Experienced	5 – 10 years	22	22.70
	11 – 15 years	10	10.30
	16 – 20 years	4	4.10
	21 – 25 years	3	3.10
	26 – 30 years	1	1.00
	>30 years	0	0.00
Total		97	100.00

A Likert Scale was used to determine the level of use of mathematical problem solving strategies by mathematics teachers. To help the reader understand the code used in the data analysis, the researchers defined the code for each element in Table 3. These are the strategies used to solve the mathematical problems found in this study.

Table (3): Mathematical problem solving strategies

Strategy	Code
Bar Model Strategy	K1
CUBES Strategy	K2
Drawing/Diagram/Visualization	K3
Cooperative Learning	K4
Peer Tutoring Strategy	K5
Game	K6
Storytelling/Cartoon	K7
Working Backwards	K8
Guess and Check	K9
Organizing Data	K10
Finding a Pattern	K11

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Table (4): Likert Scale Code

Likert Scale	Code
Never	N
Rarely	R
Sometimes	S
Often	O
Very frequently	VF
Almost always	AA

A. Level of use of mathematical problem solving strategies

The researchers referred to the table of interpretation of the mean score used by Rahim and Mahmud (2018). The table of interpretation of this mean score served as a reference and guide for the researchers to determine the level of use of the method among mathematics teachers.

Table (5): Mean score interpretation

Mean Score	Interpretation of Mean Score
1.00 – 1.89	Very low
1.90 – 2.69	Low
2.70 – 3.49	Medium
3.50 – 4.29	High
4.30 – 5.00	Very high

To determine the level of use of mathematical problem solving strategies among Mathematics teachers, descriptive analyzes involving frequency, percentage and mean scores were conducted. Table 6 shows the number and percentage of each item based on the Likert Scale used.

Table (6): Level of use of mathematical problem solving strategies

Strategy Code	N Num (%)	R Num (%)	S Num (%)	O Num (%)	VF Num (%)	AA Num (%)
K1	8 (8.25)	18 (18.56)	21 (21.65)	33 (34.02)	15 (15.46)	2 (2.06)
K2	12 (12.37)	18 (18.56)	18 (18.56)	32 (32.99)	15 (15.46)	2 (2.06)
K3	0 (0.00)	4 (4.13)	10 (10.31)	23 (23.71)	46 (47.42)	14 (14.43)
K4	0 (0.00)	4 (4.13)	9 (9.28)	16 (16.49)	57 (58.76)	11 (11.34)
K5	1 (1.03)	5 (5.16)	11 (11.34)	26 (26.80)	44 (45.36)	10 (10.31)
K6	0 (0.00)	4 (4.13)	17 (17.53)	27 (27.83)	36 (37.11)	13 (13.40)
K7	1 (1.03)	6 (6.19)	18 (18.56)	26 (26.80)	38 (39.17)	8 (8.25)
K8	3 (3.09)	6 (6.19)	25 (25.77)	26 (26.80)	31 (31.96)	6 (6.19)
K9	2 (2.06)	6 (6.19)	13 (13.40)	27 (27.83)	42 (43.30)	7 (7.22)
K10	3 (3.09)	4 (4.13)	23 (23.71)	22 (22.68)	34 (35.05)	11 (11.34)
K11	2 (2.06)	6 (6.19)	26 (26.80)	23 (23.71)	33 (34.02)	7 (7.22)
		Total Mean		**4.10**		

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Based on the study, the overall mean achieved was 4.10. Such mean scores also suggest that the degree of use of the mathematical problem solving strategies among mathematics teachers is high. In other words, mathematics teachers in the Kanowit district often use mathematical problem solving strategies to help students solve learning difficulties.

B. Differential analysis of the use of mathematical problem solving strategy based on gender

Based on the data obtained, Table 7 shows the number of mathematics teachers using mathematical problem solving strategies by gender.

Table (7): Number of mathematics teachers using mathematical problem solving strategies by gender.

Strategy Code	Gender	Number of mathematics teachers using mathematical problem solving strategies					
		N	**R**	**S**	**O**	**VF**	**AA**
K1	Male	4	9	15	10	7	1
	Female	4	9	6	23	8	1
K2	Male	5	10	13	10	7	1
	Female	7	8	5	22	8	1
K3	Male	0	1	10	15	16	4
	Female	0	3	0	8	30	10
K4	Male	0	1	8	9	24	4
	Female	0	3	1	7	33	7
K5	Male	1	1	7	15	18	4
	Female	0	4	4	11	26	6
K6	Male	0	1	15	14	13	3
	Female	0	3	2	13	23	10
K7	Male	0	3	15	14	9	5
	Female	1	3	3	12	29	3
K8	Male	1	2	17	15	9	2
	Female	2	4	8	11	22	4
K9	Male	0	2	7	18	16	3
	Female	2	4	6	9	26	4
K10	Male	1	1	17	14	10	3
	Female	2	3	6	8	24	8
K11	Male	0	1	19	13	11	2
	Female	2	5	7	10	21	5

Before performing an analysis to determine the different levels of use of the gender-based mathematical problem solving strategies, the researchers will first define the alpha value. Generally, the alpha value used in the analysis process is $\alpha = 0.05$. However, the researcher's study involved comparing the level of usage with 11 types of mathematical problem solving strategies. Therefore, some independent t-tests must be run at the same time. This situation will cause an error of type 1, which rejects the null hypothesis correctly. Bonferroni Correction was therefore performed by researchers to avoid Type 1 errors from arising in this analysis. After Bonferroni correction, the significance level was $p = 0.005$. A significant $p=0{,}005$ level should therefore be used in this study. Table 8 shows the mean of gender based on the level of use of the mathematical problem solving strategies.

Table (8): Mean of gender based on the level of use of the mathematical problem solving strategies

	Group Statistics				
	Gender	N	*Mean*	*Std. Deviation*	*Std. Error Mean*
K1	Male	46	3.22	1.25	.18
	Female	51	3.49	1.24	.17

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K2	Male	46	3.15	1.30	.19
	Female	51	3.37	1.36	.19
K3	Male	46	4.26	.98	.14
	Female	51	4.86	.94	.13
K4	Male	46	4.48	.96	.14
	Female	51	4.78	.92	.13
K5	Male	46	4.30	1.05	.16
	Female	51	4.51	1.07	.15
K6	Male	46	4.04	.99	.15
	Female	51	4.69	1.03	.14
K7	Male	46	3.96	1.12	.16
	Female	51	4.45	1.05	.15
K8	Male	46	3.74	1.04	.15
	Female	51	4.16	1.26	.18
K9	Male	46	4.22	.96	.14
	Female	51	4.27	1.25	.18
K10	Male	46	3.87	1.07	.16
	Female	51	4.43	1.29	.18
K11	Male	46	3.85	.97	.14
	Female	51	4.18	1.31	.18

The following Table 9 shows the results of the analysis of mean differences between male and female mathematics teachers.

Table (9): Mean differences between male and female mathematics teachers

Independent Samples Test										
Variances							*t-test for Equality of Means*		*99% Confidence Interval of the Difference*	
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std.Error Difference*	*Lower*	*Upper*
K1	***Equal variances assumed***	**.040**	**.843**	**-1.080**	**95**	**.283**	**-.273**	**.253**	**-.937**	**.391**
	Equal variances not assumed			-1.080	93.869	.283	-.273	.253	-.937	.391
K2	***Equal variances assumed***	**.473**	**.493**	**-.815**	**95**	**.417**	**-.220**	**.270**	**-.931**	**.490**
	Equal variances not assumed			-.817	94.643	.416	-.220	.270	-.929	.489
K3	***Equal variances assumed***	**2.687**	**.104**	**-3.095**	**95**	**.003**	**-.602**	**.194**	**-1.113**	**-.091**
	Equal variances not assumed			-3.088	93.086	.003	-.602	.195	-1.114	-.089
K4	***Equal variances assumed***	**2.539**	**.114**	**-1.600**	**95**	**.113**	**-.306**	**.191**	**-.809**	**.197**
	Equal variances not assumed			-1.596	93.091	.114	-.306	.192	-.810	.198
K5	***Equal variances assumed***	**.008**	**.931**	**-.954**	**95**	**.342**	**-.205**	**.215**	**-.771**	**.360**
	Equal variances not assumed			-.955	94.218	.342	-.205	.215	-.771	.360
K6	***Equal variances assumed***	**.000**	**.985**	**-3.130**	**95**	**.002**	**-.643**	**.205**	**-1.183**	**-.103**
	Equal variances not assumed			-3.137	94.623	.002	-.643	.205	-1.181	-.104
K7	***Equal variances assumed***	**.288**	**.593**	**-2.254**	**95**	**.026**	**-.494**	**.219**	**-1.071**	**-.082**
	Equal variances not assumed			-2.247	92.385	.027	-.494	.220	-1.073	-.084
K8	***Equal variances assumed***	**1.548**	**.217**	**-1.773**	**95**	**.080**	**-.418**	**.236**	**-1.037**	**.202**
	Equal variances not assumed			-1.790	94.382	.077	-.418	.233	-1.031	.196
K9	***Equal variances assumed***	**3.118**	**.081**	**-.250**	**95**	**.803**	**-.057**	**.229**	**-.658**	**.544**
	Equal variances not assumed			-.253	92.829	.801	-.057	.226	-.650	.536

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K10	***Equal variances assumed***	**1.566**	**.214**	**-2.329**	**95**	**.022**	**-.562**	**.241**	**-1.196**	**-.072**
	Equal variances not assumed			-2.351	94.383	.021	-.562	.239	-1.190	-.066
K11	***Equal variances assumed***	**3.752**	**.056**	**-1.396**	**95**	**.166**	**-.329**	**.235**	**-.947**	**.290**
	Equal variances not assumed			-1.418	91.558	.160	-.329	.232	-.939	.281

Based on the results obtained, the mean difference between male and female mathematics teacher was reported as significant at the p = 0.005 level. In total, 9 different types of mathematical problem solving strategies have shown no significant difference in the mean level of use between male and female mathematics teachers. The strategies used are K1, K2, K4, K5, K7, K8, K9, K10, K11. Whereas K3 and K6 showed significant differences in the level of use of the strategies between the male and female mathematics teacher. With a ratio of 9:2, this study shows that there is no significant difference in the mean level of use of mathematical problem solving strategies between male and female mathematics teachers in Kanowit district.

C. Differential analysis of the use of mathematical problem solving strategies based on experience

From the data collected, Table 10 provides data on the number of mathematics teachers using mathematical problem solving strategies by experience**.**

Table (10): Number of mathematics teachers using mathematical problem solving strategies by experience

Strategy Code	Teacher Experience in Mathematics	Number of Mathematics Teachers using Mathematical Problem Solving Strategies					
		TP	**JS**	**AJ**	**J**	**K**	**SK**
K1	Novice	4	13	11	21	7	1
	Experienced	4	5	10	12	8	1
K2	Novice	7	13	10	20	6	1
	Experienced	5	5	8	12	9	1
K3	Novice	0	3	6	16	26	6
	Experienced	0	1	4	7	20	8
K4	Novice	0	3	5	10	35	4
	Experienced	0	1	4	6	22	7
K5	Novice	1	4	6	15	25	6
	Experienced	0	1	5	11	19	4
K6	Novice	0	3	9	17	23	5
	Experienced	0	1	8	10	13	8
K7	Novice	1	5	11	13	23	4
	Experienced	0	1	7	13	15	4
K8	Novice	2	5	15	14	19	2
	Experienced	1	1	11	11	12	4
K9	Novice	1	5	8	13	27	3
	Experienced	1	1	6	13	15	4
K10	Novice	2	3	15	11	22	4
	Experienced	1	1	8	11	12	7
K11	Novice	1	5	15	11	23	2
	Experienced	1	1	11	12	10	5

Two-sample t-tests were performed to evaluate mean differences between novice and experienced teachers through SPSS software. Bonferroni Correction was also performed to prevent type 1 errors from occurring in this study. Therefore, the significance level used was p = 0.005. Table 11 shows the mean of the mathematics teacher experience based on the level of use of the mathematical problem solving strategy.

Table (11): Mean of mathematics teachers using mathematical problem solving strategies by experience

	Group Statistics				
	Experience	**N**	***Mean***	***Std. Deviation***	***Std. Error Mean***
K1	Novice	57	3.30	1.21	.16
	Experienced	40	3.45	1.30	.21
K2	Novice	57	3.14	1.29	.17
	Experienced	40	3.45	1.38	.22
K3	Novice	57	4.46	1.00	.13
	Experienced	40	4.75	.98	.16
K4	Novice	57	4.56	.95	.13
	Experienced	40	4.75	.95	.15
K5	Novice	57	4.35	1.14	.15
	Experienced	40	4.50	.93	.15
K6	Novice	57	4.32	1.02	.14
	Experienced	40	4.48	1.11	.18
K7	Novice	57	4.12	1.18	.16
	Experienced	40	4.35	.98	.15
K8	Novice	57	3.86	1.19	.16
	Experienced	40	4.10	1.15	.18
K9	Novice	57	4.21	1.15	.15
	Experienced	40	4.30	1.09	.17
K10	Novice	57	4.05	1.22	.16
	Experienced	40	4.33	1.21	.19
K11	Novice	57	3.96	1.16	.15
	Experienced	40	4.10	1.17	.19

Table (12): Mean Differences Level of Use of Strategies Based on Teacher Experience

Independent Samples Test										
Variances							*t-test for Equality of Means*		*99% Confidence Interval of the Difference*	
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std.Error Difference*	*Lower*	*Upper*
K1	**Equal variances assumed**	**.124**	**.726**	**-.590**	**95**	**.557**	**-.152**	**.257**	**-.839**	**.525**
	Equal variances not assumed			-.582	80.177	.562	-.152	.261	-.839	.536
K2	**Equal variances assumed**	**.178**	**.674**	**-1.133**	**95**	**.260**	**-.310**	**.273**	**-1.028**	**.409**
	Equal variances not assumed			-1.120	80.478	.266	-.310	.277	-1.039	.420
K3	**Equal variances assumed**	**.346**	**.558**	**-1.435**	**95**	**.155**	**-.294**	**.205**	**-.832**	**-.244**
	Equal variances not assumed			-1.440	85.188	.153	-.294	.204	-.831	-.244
K4	**Equal variances assumed**	**.052**	**.821**	**-.964**	**95**	**.338**	**-.189**	**.196**	**-.703**	**.326**
	Equal variances not assumed			-.962	83.606	.339	-.189	.196	-.705	.328
K5	**Equal variances assumed**	**1.276**	**.261**	**-.681**	**95**	**.497**	**-.149**	**.219**	**-.724**	**.426**
	Equal variances not assumed			-.706	92.699	.482	-.149	.211	-.705	.407
K6	**Equal variances assumed**	**.823**	**.367**	**-.730**	**95**	**.467**	**-.159**	**.218**	**-.733**	**-.414**
	Equal variances not assumed			-.719	79.549	.474	-.159	.221	-.744	-.425
K7	**Equal variances assumed**	**1.523**	**.220**	**-1.000**	**95**	**.320**	**-.227**	**.227**	**-.824**	**-.370**
	Equal variances not assumed			-1.034	92.417	.304	-.227	.220	-.805	-.351
K8	**Equal variances assumed**	**.188**	**.666**	**-.994**	**95**	**.323**	**-.240**	**.242**	**-.876**	**.395**
	Equal variances not assumed			-1.000	85.720	.320	-.240	.240	-.874	.393

K9	**Equal variances assumed**	**.284**	**.595**	**-.386**	**95**	**.700**	**-.089**	**.232**	**-.699**	**.520**
	Equal variances not assumed			-.390	86.600	.698	-.089	.230	-.694	.516
K10	**Equal variances assumed**	**.009**	**.923**	**-1.089**	**95**	**.279**	**-.272**	**.250**	**-.930**	**.385**
	Equal variances not assumed			-1.091	84.522	.278	-.272	.250	-.930	.386
K11	**Equal variances assumed**	**.243**	**.623**	**-.561**	**95**	**.576**	**-.135**	**.241**	**-.768**	**.498**
	Equal variances not assumed			-.560	83.741	.577	-.135	.241	-.771	.501

Based on the results obtained, the mean difference in the level of use of mathematical problem solving strategies between the novice and experienced teachers was reported as significant at $p = 0.005$ level. Overall, the results showed that there were no significant mean differences in the level of use of mathematical problem solving strategies between novice and experienced teachers. Then the null hypothesis is constructed to fail.

V. DISCUSSION

In this study, the researchers lists only 11 types of common and easy-to-find mathematical problem solving strategies by browsing the web. Among the strategies listed in this study are Bar Model strategy, CUBES strategy, Drawing / Graphic / Visualization Technique, Cooperative Learning Strategy, Peer Tutoring Strategy, Game Strategy, Storytelling / Cartoon, Working Backwards, Data Organizing Strategy and Finding a Pattern. The respondents had to choose their level of use of the strategies already listed on a Likert Scale such as never, rarely, sometimes, often, very frequently and almost always.

Based on the findings of the survey, the researchers found that many of the respondents 'very frequently' used the mathematical problem solving strategies described in this report. Based on the data, the researchers also found that 57 respondents (58.76%) 'very frequently' used the Cooperative Learning Strategy in their teaching and learning processes. This is the largest number compared to the level of use of other strategies. With this in mind, mathematics teachers can often be said to be part of group activities.

The researchers believe that the Cooperative Learning Strategy is most commonly used by mathematics teachers as a result of 21st century learning (PAK-21) that Malaysia Education Ministry has been implementing since 2014. PAK-21 is no longer a teacher-centered but a student-centered learning experience. The components of this learning process include teamwork, communication, innovative and critical thinking, as well as pure and ethical principles. In this context, Cooperative Learning Strategy is a student-centred learning strategy that also addresses elements such as collaboration, communication, creative thinking and critical thinking. This statement was also supported by Nieuwoudt (2015) who argued that cooperative learning is a way to engage students in problem solving.

In addition to the Cooperative Learning Strategy, the researchers found that Drawing / Graphic / Visualization Technique was also one of the most widely used strategy used by respondents in this survey. A total of 46 respondents (47.42%) 'very frequently' used this strategy in their teaching and learning process. Researchers believe that the Drawing / Graphic / Visualization Technique is commonly used as one of the most effective strategies for all students to learn. This can be corroborated by a study by Lesen (2016) which shows that students with a high level of thinking are more likely to draw symbols, and students with a lower level of thinking are more likely to draw actual pictures.

Findings from the survey also revealed that the Peer Tutoring Strategy is also one of the most commonly used strategies used by mathematics teachers in the Kanowit district. A total of 44 respondents (45.36%) 'very frequently' used this strategy in their teaching and learning process. Peer Tutoring Strategy and Cooperative Learning Strategy are two strategies that are similar but also different. The differences between the two strategies are that students need to analyze, interact and share ideas on how to solve problems. In the case of differences, Carr et al. (2016) stated that the Peer Tutoring Strategy is a paired learning method that can involve different levels of achievement so that one of them can provide guidance and guidance to his or her partner.

Based on the results of the analysis, the researchers found that only the Bar Model Strategy and the CUBES strategy showed a low percentage of 'very frequently' and 'almost always' use levels. Not only that, both strategies also show a higher percentage of 'never' usage compared to other strategies. There were 8 mathematics teachers (8.25%) who had never used the Bar Model Strategy, and 12 mathematics teachers (12.37%) had never used the CUBES Model in their teaching and learning process. Although both strategies are being introduced by foreign educators, our country's educators are also conducting studies on both methods. But the results show that there are still many mathematics teachers who do

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not understand and apply these two forms of teaching and learning processes. As a mathematics teacher, studying and applying a variety of strategies that are relevant to the student level is essential to enhancing student achievement in solving mathematics problems.

The study found that there was no significant mean difference between male and female mathematics teacher in 9 types of strategies. While other strategies have shown significant differences between male and female mathematics teachers. The two types of strategies are Drawing / Graphic / Visualization Technique and Game Strategy . The ratio of 9:2 was established in this situation. The results of this analysis are therefore categorized as no significant mean difference between male and female mathematics teachers. For the mean difference between the novice and experienced teacher, the researchers found that there was no significant difference in the level of use of all the strategies defined between the novice and the experienced teacher. Thus, no major mean difference between novice and experienced teachers.

LIMITATION OF STUDY AND SUGGESTIONS

Based on the limitations and results of the study, the researchers suggest that further studies should take into account the following aspects: As only one research instrument is used, researchers therefore suggest that future studies may conduct interview sessions to improve the accuracy of the findings. This research only includes 11 types of mathematical problem solving strategies. It is suggested that future studies can list more forms of mathematical problem solving strategies. The researchers recommend that the questionnaire provided be improved as well. The researchers propose that respondents be given the opportunity to articulate the strategies often used in the teaching and learning process before they state whether they are aware of the strategies. The nominal scale (Yes / No) can be used in this section. Subsequently, the respondents replied on the level of use of the strategies indicated. This means that the researcher may be given more accurate feedback. The design of the study is validated only by a mathematician. It is proposed that more than one mathematician should be employed in future studies to increase the validity and reliability of the questionnaire items.

VI. CONCLUSION

The ability and skills of a student to solve mathematical problems are closely related to their cognitive development. Teachers should be knowledgeable and conscious about the appropriate ways to help and enhance students' ability to solve mathematical problems, especially in questions involving high order thinking skills (HOTS). For example, for students who are still poor in understanding basic mathematics concepts, teachers need to provide tangible resources, such as 3D models, to stimulate their thought. In addition to concrete materials, teachers can also use colourful and relevant pictures to inspire students to think more creatively.

In addition, mathematics teachers also need to allow students the opportunity to find alternative solutions before the teacher shows how to solve them. Students need to be given opportunities to connect, debate and share ideas to help them develop self-confidence and strengthen their mathematical problem solving skills. In this sense, the Cooperative Learning and the Peer Tutoring Strategy are the best way to develop a mechanism of interaction between students.

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