

# Binary outcomes utilizing varied strategies in familiarizing science concepts

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## Abstract

*This research endeavor aimed to find out the probability of obtaining a proficient performance in familiarizing science concepts using varied strategies. Also, it was directed on determining significant difference on the performance of students in science when exposed to varied strategies. One hundred eighty students from F. Bangoy National High School were chosen as respondents of the study. Descriptive- predictive and quasi- experimental design were employed in the study. The statistical tools used were mean and standard deviation, frequency and percentage, logistic regression, univariate analysis and Eta- squared. The results revealed that Puzcellized method was the best intervention among the three strategies. Majority of the students were at the below proficiency level. Varied strategies do not significantly predict performance of students in science. There was significant difference in the performance of students in familiarizing science concepts when exposed to varied strategies. And the effect of varied strategies to the performance of students in familiarizing science concepts was large.*

## Introduction

Scanty instructional materials in teaching science lessons greatly affected comprehension and retention skills of the students. Certainly, manifestations by students in F. Bangoy National High School have indicated poor performance in familiarizing anatomy of certain object using the conventional method. To note, learning strategies interact with personal characteristics of students. There is no ideal strategy which generates success in all learning situations. Students should be trained to develop an understanding and skills for using appropriate strategies that satisfy their needs. This horrible fact can be remedied by using puzzle in teaching the lesson.

Extant studies revealed that the use of puzzle game was found to be effective in improving the performance of the students. In Southwestern Nigeria, CPP (Crossword -Picture Puzzle) Teaching Strategy was employed to public junior secondary schools which demonstrated significant effect on the achievement score of the students (Olagunju & Babayemi, 2014). In addition, Hmielski (2003) supported the claimed of Adeyemo et al., (2013) asserted that students learning styles through the use of puzzle method impact on their performance, and that students learn effectively. Due to these individual differences their performance will be based on what they have learnt in one way or the other.

## Research Questions

This study aimed to find out the likelihood and effectiveness of varied strategies in obtaining a proficient performance of students in familiarizing science concepts. Specifically, it was directed to answer the following questions:

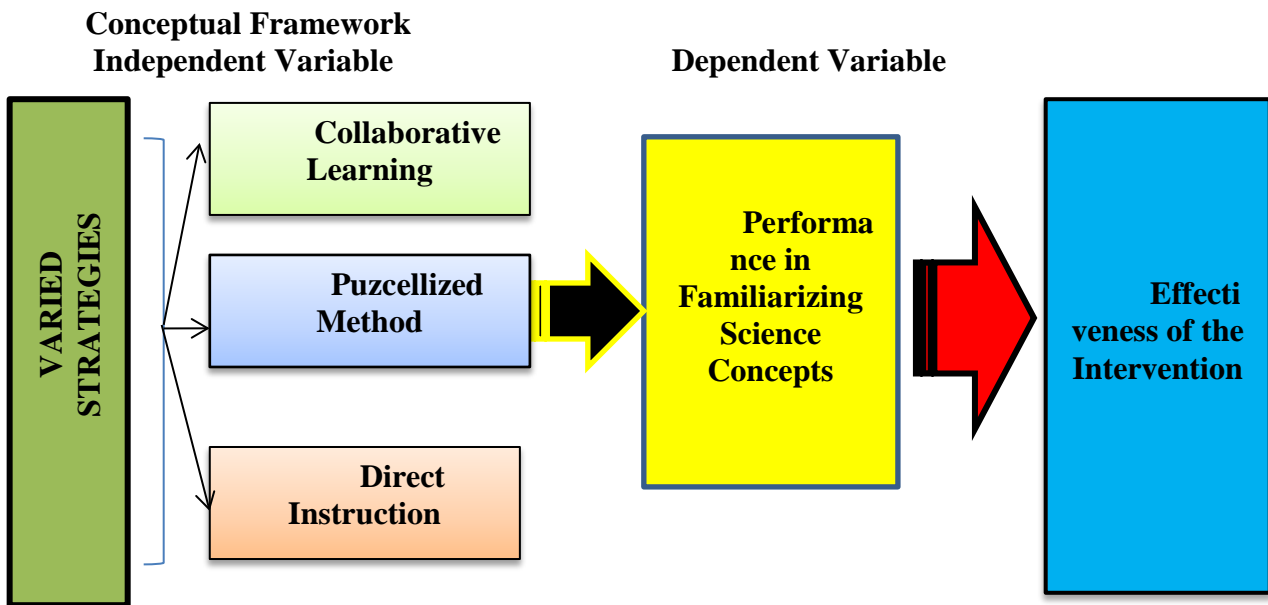
1. What is the level of performance of the respondents in terms of pretest and posttest scores when exposed to collaborative learning, puzcellized method and direct instruction?
2. What is the profile of performance of the students in science?
3. Which of the strategies best predicts performance in familiarizing science concepts?
4. Is there a significant difference in the performance of students in familiarizing science concepts when exposed to varied strategies?
5. What is the magnitude of effect of the varied strategies in familiarizing science concepts?

## Methodology and Research Design

The study utilized two designs, one for the first phase in predicting outcomes and the other one for determining effect size of the intervention. Hence, the study carried out descriptive- predictive research design which was concerned with and designed solely to explain the present distribution of variables, without regard to causal or other hypotheses. Meanwhile, it focused on predicting decisions about individuals or to aid in various

types of selection. Also, it made use of quasi- experimental design which was a non- equivalent control group pretest- posttest design. Non- equivalent design was a good design when you have access to one group for your experimental. This design was used by the researcher because the subjects of the study were intact group of the grade seven students in integrated science class in a naturally assembled setting at F. Bangoy National High School, Sasa, Davao City.

Correspondingly, the statistical tools used in the analysis of data were Mean and standard deviation, frequency and percentage, logistic regression, univariate analysis and Eta- squared.



**Figure 1. Conceptual Paradigm of the Study**

The figure above displayed the conceptual framework of the study. The independent variable of the study was varied strategies which were made up of collaborative learning, direct instruction and puzcellized method. On the other hand, the performance of students in familiarizing science concepts acted as the dependent variable of the study. The study involved two stages or phases: it started with prediction using the three strategies that would explain performance of students in familiarizing science concepts. The next phase was to determine if there was significant difference in the performance of students when exposed to varied strategies. And the result obtained was used as basis in determining the effect size of the intervention. The variables used in the study were continuous or metric data.

### Theoretical Framework

The use of puzzle is anchored on Constructivist view which posits that learning is a social process, whereby students construct new concepts based on current knowledge. Hence, effective learning takes place when science is taught through a medium of puzzle games; and it is known that information's are easier to recall when it has been presented through puzzle games.

### Research Respondents

The study only considered three sections in grade seven of F. Bangoy National High School, Sasa, Davao City. This was composed of one hundred eighty students where each section has sixty students. The number of respondents used was apt to the research design in determining significant differences. The respondents belong to the heterogeneous group.

## Instruments

In obtaining data for the study, this research utilized test questions that measure respondents' knowledge in the topic differentiating plant and animal cell. The scores obtained by the respondents were product of exposure to varied strategies. Each section was exposed to teaching intervention; one section for collaborative learning, second for direct instruction and third for puzcellized method. The performance of students in familiarizing science concepts was measured in terms of their grade.

## Results and Discussion

Based on the data collated and analyzed, this section highlights the significant result of the study.

**Table 1. Mean Scores When Exposed to Varied Strategies**

Strategies	N	Pretest SD	Posttest SD	Pretest Mean	Posttest Mean	Descriptive Interpretation
Collaborative Learning	60	1.50	3.25	3.73	10.63	Very Low to Average
Puzcellized Method	60	2.11	3.53	5.50	13.18	Low to High
Direct Instruction	60	2.05	3.47	4.05	7.07	Very Low to Low

Table 1 displays the mean scores of the different groups when exposed to the designed intervention or varied strategies. It reveals that puzcellized method registered the highest mean score of 5.50 and 13.18 both in the pretest and posttest. Meanwhile, direct instruction ranks second in the pretest with a mean score of 4.05 and 3.73 for collaborative learning. The posttest score of direct instruction is 7.07 which is the lowest among the three. Overall, it generated a low to high interpretation for puzcellized method, very low to average for collaborative learning and very low to low for direct instruction. The result suggests that puzcellized method is the best intervention among the three because it increases or enhances the performance of students in familiarizing science concepts.

**Table 2. Profile of Performance in Science of Grade 7 Students**

Performance in Science	Frequency	Percentage	Descriptive Interpretation
0	127	70.6	Below Proficient
1	53	29.4	Proficient to Advance
<b>Total</b>	180	100.0	

Table 2 shows the profile of performance of grade seven students in science. It depicts that performance of students coded with 0 or 70.6% registered below proficiency while those coded with 1 or 29.4% performed in the proficient to advance level. This means that students coded with 1 demonstrated better performance in science compared to students coded with 0.

**Table 3. Significant Influence of Varied Strategies on the Performance in Familiarizing Science Concepts of Grade 7 Students**

DV	Variables in the Equation			Decision
	B	Exp (B)	p-value	
<b>Constant</b>	4.07	58.54	.20	
<b>Puzcellized Method</b>	-.28	.76	.29	Not Significant
<b>Collaborative Learning</b>	-.33	.72	.15	Not Significant
<b>Direct Instruction</b>	-.21	.81	.35	Not Significant

Table 3 exposes the significant influence of varied strategies on the performance in familiarizing science concepts. The result showed that the three varied strategies are not significant predictors of performance of

students in familiarizing science concepts. Hence, this suggests that other factors should be considered in explaining performance of students in science.

Further, Salawu (1999) asserts that the method of teaching could be regarded as the vehicle through which a message is delivered. Hence, methods of teaching are one of the factors to be considered in explaining performance of the students. This proves that this study should not be limited only to varied strategies in determining students' outcomes in a subject area.

**Table 4. Univariate Analysis on the Significant Difference in the Performance of Students in Familiarizing Science Concepts**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	390.025	2	195.013	46.596	.000
Within Groups	740.775	177	4.185		
Total	1130.800	179			

Table 4 depicts the univariate analysis on the significant difference on the performance of students in familiarizing science concepts. It generated an F- value of 46.60 with a p-value of .000 which is lesser than .05 level of significance. This implies that there is a significant difference on the performance of students in familiarizing science concepts. Students who are exposed to puzcellized method had an improved performance as depicted with the highest mean score in the posttest (M=13.18) compared to students who are exposed to direct instruction and collaborative learning. Significant learning is achieved once students had an actual experience in manipulating or familiarizing concepts that are seen and learned directly.

The result above agrees with findings of Adeyemo et al, (2013) which assert that students in four selected schools in Mushin Local Government, Lagos, Nigeria who were exposed to puzzle method performed better in science. Meanwhile, cooperative learning has also shown benefits which include academic gains across different curriculum domains (Slavin et al., 2003) as well as positive effects of cooperative learning on interpersonal attitudes, behaviors, values and skills.

**Table 5. Magnitude of Effect of Varied Strategies to the Performance of Students in Familiarizing Science Concepts**

Sum of Squares between Groups	Total Sum of Squares	Eta- Squared	Remarks
390.025	1130.80	.34	Large

Table 5 reveals the magnitude of effect of varied strategies to the performance of students in familiarizing science concepts. The Eta- squared value tallies .34 which signifies large effect. Thus, varied strategies in general significantly contributed a significant or huge effect to the performance of students in familiarizing science concepts. The Eta- squared was calculated by dividing sum of squares between groups over the sum of squares total. The interpretation or remarks is based on Cohen's (1988) classification: .01 as a small effect, .06 as a medium effect and .14 as a large effect.

## Conclusion

Based on the findings of the study, the following conclusions were drawn:

1. The performance of the students when exposed to varied strategies was as follows: high for puzcellized method; average for collaborative learning and low for direct instruction.
2. The profile of performance of students in science was below to proficient.
3. Among the three strategies, no strategy significantly predicted performance of students in familiarizing science concepts.
4. There was significant difference in the performance of students in familiarizing science concepts when exposed to varied strategies.
5. The effect of varied strategies to the performance of students in familiarizing science concepts was large.

## Recommendation

Based on the conclusions drawn, the following are offered:

1. Intensify the application of Puzcellized instruction to topics that deals with visual images.
2. It should be adopted as one of the teaching strategies in handling or teaching science lessons.
3. Curriculum planners and science teachers could make use of puzzle for effective basic science delivery in schools.
4. Use other predictors in explaining performance of students in science.
5. Conduct similar studies to validate its findings.

## References

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