

# Enhancing Teachers' Pedagogical Practice in Mathematics Through 5E Model Focused Inquiry-Based Learning (IBL) on Learning Action Cell (LAC) Session

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Received May 06, 2020; Revised June 08, 2020; Accepted June 15, 2020

**Abstract** The performance of the learners in Mathematics is a perennial problem in the academe would it be basic or higher education. The Department of Education is continuously investing and provides training to teachers for the improvement of the achievement level of the students. In particular, 5E Model focused on Inquiry-based Learning was introduced through Learning Action Cell (LAC) sessions to the teachers from Grade 1 to 12. The characteristics of the teachers in lesson planning and delivery of lesson was also measured. The grades of the students in second grading was used as baseline of the intervention. The LAC sessions were conducted within ten Fridays. The educational background of the teachers was also determined and the effectiveness of the LAC session to the performance of the teacher. The findings revealed that teachers have outstanding performance in lesson planning and delivery of lessons. The majority of the teachers are Baccalaureate degree graduates. The results also showed that teachers strongly agree that LAC sessions help improve their teaching performance. Furthermore, it findings showed that there was a significant increase of grades of the students in the third grading. It also showed that educational background and the conduct of LAC session have of no significant relation to students' achievement, while teachers' performance has significant relation. It is concluded that teachers' performance has significant relation to students' achievement. It is recommended to encourage teachers to pursue post graduate studies, continue the application of 5E model in teaching and the conduct of the LAC session should be done regularly for the entire school year with well-organized LAC session plan.

**Keywords:** 5E Model, LAC session, inquiry-based learning, lesson planning

**Cite This Article:** Emigdio J. Cartilla, and Janneth Q. Rondina, "Enhancing Teachers' Pedagogical Practice in Mathematics Through 5E Model Focused Inquiry-Based Learning (IBL) on Learning Action Cell (LAC) Session." *American Journal of Educational Research*, vol. 8, no. 6 (2020): 416-419. doi: 10.12691/education-8-6-8.

## 1. Introduction

The performance of the learners in Mathematics in the workplace of the researcher caught his attention. It is the lowest in all the subject areas. The mean percentage score of the test result in the first quarter examination was consolidated and result showed that 36 percent of the learners from Grade 1 to 12 got below 75 percent. The researcher thinks of some factors that caused the test result. In his observation, all teachers in the school are newly hired teachers. It is the practice of the division office of assigning newly hired teachers in the farthest barangays. The researcher who is the school head also observed that teachers do not practice pedagogical approaches that best suited in teaching mathematics. The quality of instruction and effective instructional design are necessary to minimize problems related to teaching and learning mathematics [1]. The Filipino students excel in knowledge acquisition but fare considerably low in

lessons requiring higher order thinking skills. This disappointing condition is evident in the performance of students in national and international surveys on Mathematics and Science competencies [2]. This prompted Department of Education Order No. 72, s. 2011 [3] to order school officials to exert greater effort in raising National Achievement Test (NAT) scores among elementary and high school students. The Department Order stressed the need to raise the learning outcomes among schools, which classified under the poor achievement, and lower average rates. All the divisions and the district supervisors directed to provide intensive supervision to these schools. SEAMEO INNOTECH [4] documented various Inquiry-Based Teaching and Learning (IBTL) practices in their study about nurturing the critical and creative thinking of preschool and early grade learners, not just as a pedagogical approach, but also as an approach to thinking. Developing the discipline of inquiry-based learning as early as age 3 to 8 facilitates the development of 21st century skills and prepares the child for further schooling.

In the website of the Philippine Basic Education posted on 2015, stated that the Department of Education in the Philippines touts its mathematics as a curriculum that makes use of the following: multi/interdisciplinary approach, science-technology-society approach, contextual learning, problem/issue-based learning, and inquiry-based approach. At first glance, these approaches sound attractive, but the difficulty in implementing any one of these is often underestimated and unappreciated. Each one of these approaches requires is frequently taken for granted. Worse, these approaches are oftentimes not fully understood. This is the scenario observed by the researcher in the school. In the study of Iheanachor [5], indicated that, there is a significant positive relationship between students' academic achievement in mathematics and teachers' background. Teachers who have good qualifications in mathematics have their students performed better in mathematics. Factors for students' failure according to HakiElimu [6] was inadequate in service training, few qualified teachers to teach mathematics. The DO 35, s. 2016 [7] known as the "Learning Action Cell (LAC) as a K to 12 Basic Education Program School-Based Continuing Professional Development Strategy for the Improvement of Teaching and Learning". Through this policy, the DepEd fully supports the continuing professional development of its teaching personnel based on the principle of lifelong learning and DepEd commitment to the development of the teachers' potentials aimed towards their success in the profession. This can be done through the school-based LAC, which primarily functions as a professional learning community for teachers that will help them improve practice and learner achievement. In the perspective of the discussions above, it shows that there are some factors contributed to the low performance of the students. With this, the researcher decided to focus on determining the teaching practices and strategies in teaching mathematics, particularly the application of IBL approach in 5E model and how it is employed in student learning process. Furthermore, the researcher aims to determine how do LAC sessions focused on IBL approach in 5E model lesson employed as a Teachers' Development Program (TPD) emulate teachers' practice and to improve learners' performance.

## 2. Methodology

### 2.1. Data Gathering and Statistical Treatment

Nineteen teachers from Grade 1 to Grade 12 were observed in their lesson planning and delivery of lesson. Learning action cell sessions were conducted to improve the skills of the teachers in lesson planning and delivery of the lesson using 5E model. The average of the learners in second and third grading were also gathered to determine the increase after the teachers were trained during LAC sessions. The teachers answered questionnaire confirming their performance before and after the conduct of LAC sessions and also the effectiveness of the LAC sessions. The performance of the teachers and the effectiveness of LAC session were analyzed using mean and standard deviation. The significant difference between the teachers'

performance before and after the conduct of LAC session and the achievement of the learners in second and third grading were also analyzed using T-test.

## 3. Results and Discussion

**Table 1. T-Test Paired Two-Sample for Means**

Mean	3.36	2.63
Variance	0.023	0.008
Observations	5	5
df	4	4
T Stat	11.37	
P(T<=t) one-tail	0.0002	Significant
F Critical one-tail	2.132	

Comparison of Lesson Planning Using 5E Model.

**Table 1** shows the T-Test Paired Two-Sample for Means. It gives a p-value of 0.0002 which is less than the critical value of 0.05 level of significance. The result revealed that there is a significant difference of the mean scores of teachers' skills in lesson planning as evaluated before and after the conduct of LAC sessions.

The results further revealed that though most of the teachers are new to their service, the conduct school-based LAC sessions which is considered as professional development of the teachers indicates the improvement of their lesson planning skills and thus, resulted to outstanding performance.

**Table 2. T-Test Paired Two-Sample for Means Comparison of Delivery of Lesson Using 5E Model**

Mean	3.49	2.67
Variance	0.034	0.032
Observations	10	10
df	9	9
T Stat	10.23	
P(T<=t) one-tail	0.000	Significant
T Critical one-tail	1.83	

The **Table 2** shows the result of the T-Test Paired Two-Sample for Means of the teachers' performance in delivering lesson before and after the conduct of LAC sessions. The analysis yielded a p-value of 0.000 which implicates that there is a significant difference in the performance of teachers particularly in delivering the lessons after the conduct of LAC. This means further that an increase of mean in teachers' evaluation pertaining to the delivery of the lesson was statistically significant. In addition, the result further implied that teachers' gained relative to pedagogical knowledge which is helpful in the teaching career are impressive.

It can be recalled that the conduct of LAC sessions is mandated in DepEd Order No. 35, 2016. It is a school-based continuing professional development strategy for the improvement of teaching and learning. The result of the study confirms the notion of the DepEd administrators as stipulated

**Table 3. Educational Background of the Respondents**

Description	f	%
Baccalaureate Degree Graduate	9	47%
With MA Units	8	42%
MA Graduate	1	5%
With PhD units	1	5%
PhD Graduate	0	0%
<b>Overall Total</b>	<b>19</b>	<b>100%</b>

The Table 3 shows the educational background of the respondents. Data revealed that most of the respondents which is 47% Baccalaureate degree graduate. Since most of them are new to the service they were not yet given themselves importance in post graduate studies.

Teachers who earn their advanced degrees show a deep level of understanding and commitment to the profession, allowing them to modify curriculum goals, adjust teaching methods, and enter leadership positions to enact the system-wide changes in education they wish to see. Master in Education [8].

**Table 4. T Test Result of the Students' Achievement**

	Second Grading Variable 1	Third Grading Variable 2
Mean	1.68	2.79
Variance	0.23	0.29
Observations	19	19
df	18	18
T Stat	8.49	
P(T<=t) one-tail	0.00	Significant
T Critical one-tail	1.73	

The data shows mean difference of 1.11 which means that there was an increase of the students' grades for the third grading after the LAC is implemented. In addition, the analysis yielded a P value of 0.00 which is lesser than the T critical value of 0.05 level of significance. It implied that the null hypothesis is rejected. This means that there is a significant difference between the students' achievement after the intervention. It further signifies that the intervention conducted through the LAC sessions for the teachers were effective in developing their teaching skills particularly applying the 5E in lesson planning and delivery of lesson which contributed to the improvement of students' achievement.

The result confirms the notion that LAC sessions, facilitated by a designated LAC leader, have proven to be effective in engaging a group of teachers in collaborating and solving shared challenges. LAC sessions encourage critical reflection amongst teachers which increases the understanding and knowledge of the curriculum and classroom practices. The Head Foundation UP [9]

**Table 5. Regression Analysis between Students' Achievement among Variables**

Variables	p-value	t-value	Description
Teachers' Performance	0.04	2.51	Significant
Educ. Background	0.14	8.70	Not Significant
Effectiveness of LACs	0.36	0.94	Not Significant

The data analysis shows that Teachers' Performance in teaching has significant relationship to the students'

achievement with as indicated with the p-value of .04. This means that teachers' preparations such as organized and detailed lesson plan and deliver the lesson with mastery greatly affects students' achievements. Educational Background of the teachers has no significant relationship on the students' achievement as shown in the p-value of 0.14. This means that whether the teachers' have higher educational attainment such as master's degree or PhD, it does not matter on students' performance in the Elementary and Secondary level of Education. LAC sessions shows no significant relation to the students' achievement as indicated by the p-value of 0.36. This implies the effects of LAC sessions to teachers is not automatically transmitted to the students' achievement. It further implicates that there are other factors to be considered in conducting LAC sessions for the improvement of the result which may also directly influence the increase of the students' achievement.

Effective teachers are best identified by their performance, not by their background or experience. Cantrell, and Kane [10], Suarez [11].

## 4. Conclusions and Recommendations

Based on the findings, the educational qualification of the teachers and the conduct of LAC sessions revealed that there was no significant relationship to the students' achievement. While the teachers' performance shows significant relationship. However, the performance of the teachers was improved through the conduct of the LAC sessions which implicates the increase of the students' achievement in the third grading period. It is recommended that teachers will pursue post graduate study. The conduct of LAC sessions be continued for the improvement of teachers' performance. Design improved LAC session plan to be implemented for the entire school-year. Utilize the 5E model through Inquiry-based Learning and future research will use other variables which were not used in the study for further results.

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