# THE UTILIZATION OF PROCESS ORIENTED GUIDED INQUIRY LEARNING (POGIL) TOWARDS ACHIEVEMENT IN TERTIARY CHEMISTRY

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# THE PROBLEM--- ITS BACKGROUND

**Development of a Country**

**Development of Science and Technology**

**Philippine Constitution of 1987**

**EDUCATIONAL INSTITUTIONS**

**Enhanced Basic Education Curriculum Act of 2013**

**National Elementary School Curriculum (NESC)**

**EDUCATION FOR ALL 2015 PLAN**

**Alleviation of the Quality of Education in the Country**

**New Secondary Education Curriculum (NSEC)**

**Basic Education Curriculum (BEC)**

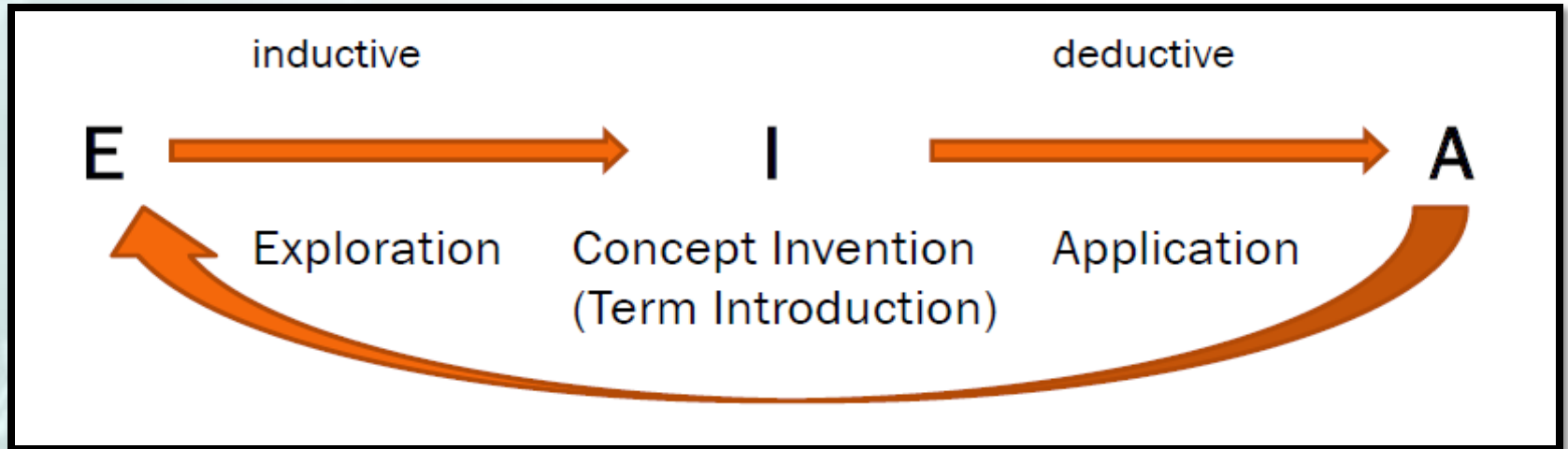**Third Elementary Education Project (TEEP)**

# THEORETICAL FRAMEWORK

| PROCESS ORIENTED GUIDED INQUIRY LEARNING (POGIL) | |
|---|---|
| **Principle** | **Strategy** |
| Acquiring | |
| Applying | |
| Generating Knowledge | |

# Learning Cycle



inductive        deductive

E       →       I       →       A

Exploration      Concept Invention (Term Introduction)      Application

**Orientation**

**Exploration**

**Concept Invention**

**Application**

**Closure**
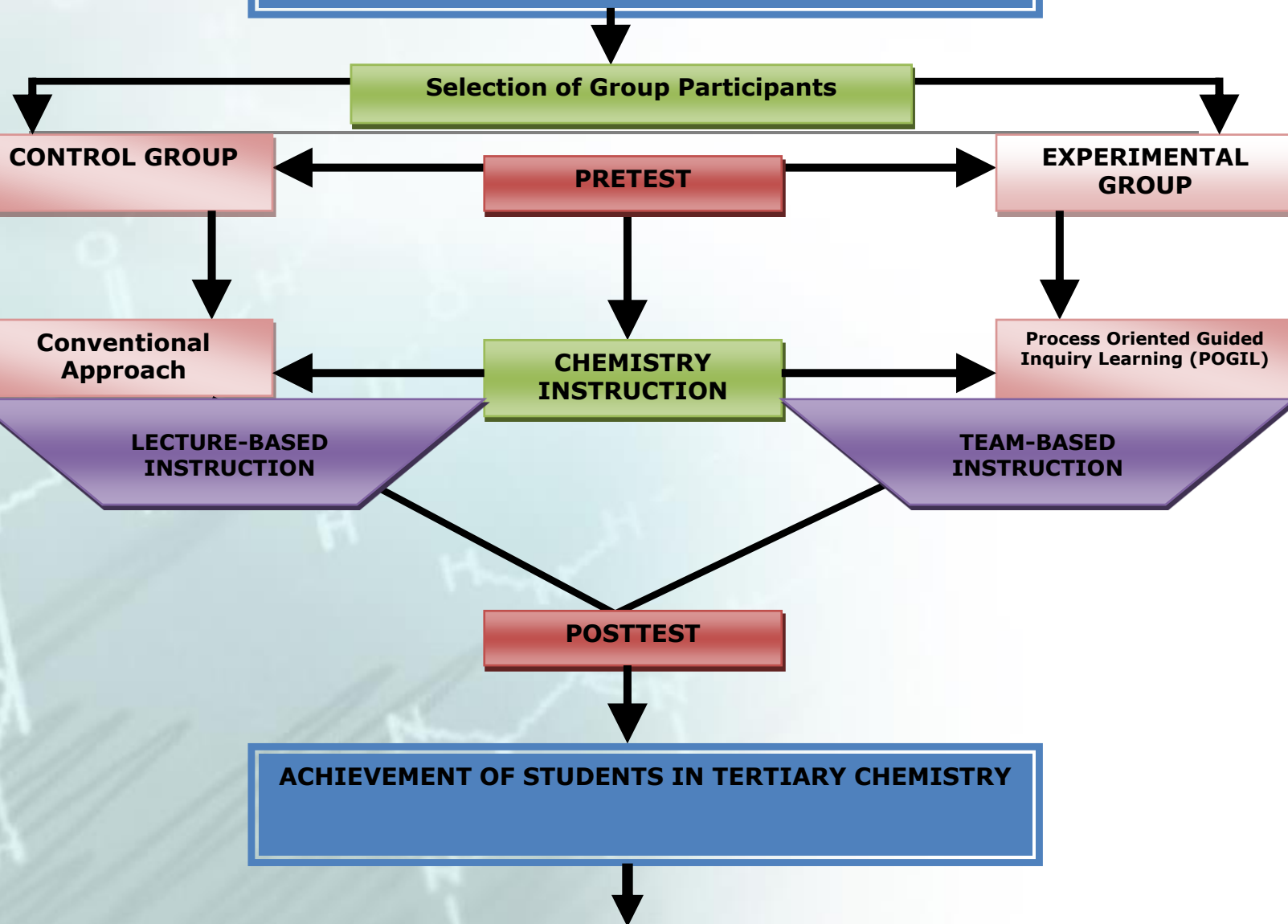
# STATEMENT OF THE PROBLEM

1. What is the pretest performance of the two groups?

   1.1 Non-POGIL Group?

   1.2 POGIL Group?

2. What significant difference exists between the pretest performance of the Non-POGIL and POGIL Groups?

3. What is the posttest performance of the to groups?

   3.1 Non-POGIL Group?

   3.2 POGIL Group?

4. What significant difference exists between the posttest performance of the Non-POGIL Group?

# STATEMENT OF THE PROBLEM

5. What significant difference can be noted between the pretest and posttest performance of the Non-POGIL Group?

6. What significant difference can be noted between the pretest and posttest performance of the POGIL Group?

7. To what extent did the POGIL setting increased the achievement of the respondents in Tertiary Chemistry?

8. What action plan can be proposed to support the utilization of Process Oriented Guided Inquiry Learning (POGIL) in Tertiary Chemistry?

# HYPOTHESES

1. There is no significant difference in the achievement in Tertiary Chemistry of student-participants exposed and not exposed in the POGIL setting in the pretest.

2. There is no significant difference in the achievement in Tertiary Chemistry of student-participants exposed and not exposed in the POGIL setting in the posttest.

# METHODOLOGY

## Research Design

**Randomized Pretest Posttest Control Group Design (Fraenkel & Wallen 2007)**

| Treatment Group | $O_1$ | x | $O_2$ |
|---|---|---|---|
| Control Group | $O_1$ | C | $O_2$ |

## Instruments Used

Pretest and Posttest

Lesson Plans

Attitudinal Questionnaire

# EQUATING OF SUBJECTS

**Test of Significance Between the Mental Ability and Attitude towards Chemistry of the POGIL and Non-POGIL Groups**

| Variable | Groups | SD | Mean | Tabular t-value | Computed t-value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| *Mental Ability* | *Non-POGIL Group* | 1.676 | 5.13 | 1.699 | 0.329 | Accept $H_o$ | Not Significant |
| | *POGIL Group* | 2.215 | 5.30 | | | | |
| *Attitude Towards Chemistry* | *Non-POGIL Group* | 0.265 | 2.86 | 1.699 | 0.320 | Accept $H_o$ | Not Significant |
| | *POGIL Group* | 0.291 | 2.89 | | | | |

# METHODOLOGY

| Treatment of Data |
|---|
| Mean |
| Standard Deviation |
| T-Test (Independent) |
| T-Test (Dependent) |

# PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

**Pretest Performance of Non-POGIL and POGIL Groups**

| Score | GROUPS | | | | Verbal Interpretation |
|---|---|---|---|---|---|
| | Non-POGIL | | POGIL | | |
| | Frequency | Percentage | Frequency | Percentage | |
| 25-30 | 0 | 0.00 % | 0 | 0.00 % | Excellent |
| 19-24 | 0 | 0.00 % | 1 | 3.33 % | Above |
| 13-18 | 3 | 10.00 % | 7 | 23.34 % | Average |
| 7-12 | 25 | 83.33 % | 21 | 70.00 % | Average |
| 1-6 | 2 | 6.67 % | 1 | 3.33 % | Below |
| | | | | | Average |
| | | | | | Poor |
| TOTAL | 30 | 100.00 % | 30 | 100.00 % | |
| Mean | 10.67 | | 11.30 | | |
| Standard Deviation | 2.279 | | 2.693 | | |
| Description | Below Average | | Below Average | | |

# PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

**Difference between the Means of the Non-POGIL and POGIL Groups in their Pretest Performances**

| | Non-POGIL Group | POGIL Group | Difference | Computed t-value | Tabular t-Value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| Mean | 10.67 | 11.30 | 0.63 | 0.983 | 1.699 | Accept $H_o$ | *Not Significant* |
| Standard Deviation | 2.279 | 2.693 | | | | | |

# PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

## Posttest Performance of Non-POGIL and POGIL Groups

| Score | GROUPS | | | | Verbal Interpretation |
|-------|--------|--------|--------|--------|-----------------------|
| | Non-POGIL | | POGIL | | |
| | Frequency | Percentage | Frequency | Percentage | |
| 25-30 | 0 | 0.00 % | 1 | 3.33 % | Excellent |
| 19-24 | 0 | 0.00 % | 5 | 16.67 % | Above Average |
| 13-18 | 19 | 63.33% | 21 | 70.00 % | Average |
| 7-12 | 11 | 36.67% | 3 | 10.00% | Below Average |
| 1-6 | 0 | 0.00 % | 0 | 0.00 % | Poor |
| TOTAL | 30 | 100.00 % | 30 | 100.00 % | |
| Mean | 13.07 | | 16.40 | | |
| Standard Deviation | 2.288 | | 3.233 | | |
| Description | Average | | Average | | |

# PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

**Difference between the Means of the Non-POGIL and POGIL Groups in their Posttest Performances**

| | Non-POGIL Group | POGIL Group | Difference | Computed t- value | Tabular t-Value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| Mean | 13.07 | 16.40 | 3.33 | 4.609 | 1.699 | Reject $H_o$ | *Significant* |
| Standard Deviation | 2.288 | 3.233 | | | | | |

# PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

**Difference between the Means of the Pretest and Postest Performances of the Non-POGIL group**

| | Pretest of the Non-POGIL Group | Posttest of the Non-POGIL Group | Difference | Computed t- value | Tabular t-Value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| Mean | 10.53 | 13.07 | 2.54 | 4.616 | 1.699 | Reject $H_o$ | Significant |
| Standard Deviation | 2.193 | 2.288 | | | | | |

**Difference between the Means of the Pretest and Postest Performances of the POGIL Group**

| | Pretest of the POGIL Group | Posttest of the POGIL Group | Difference | Computed t- value | Tabular t-Value | Decision | Interpretation |
|---|---|---|---|---|---|---|---|
| Mean | 11.30 | 16.33 | 5.03 | 8.446 | 1.699 | Reject $H_o$ | Significant |
| Standard Deviation | 2.693 | 3.241 | | | | | |

# PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

**Comparison of the Learning Gain Scores Between the POGIL Group and the Non-POGIL Group**

| | Non-POGIL Group | POGIL Group | Computed t-value | Tabular t-Value | Decision | Interpretation |
|---|---|---|---|---|---|---|
| Learning Gain Scores | 2.23 | 5.03 | 3.50 | 1.699 | Reject $H_o$ | *Significant* |
| Standard Deviation | 2.84 | 3.26 | | | | |

# PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

## ACTION PLAN FOR THE UTILIZATION OF PROCESS ORIENTED GUIDED INQUIRY LEARNING (POGIL) IN TERTIARY CHEMISTRY

**I. RATIONALE**

**II. GENEREL OBJECTIVES**

**The proposed action plan aims to:**

1. Increase the awareness of Tertiary Science instructors of the possibility of the utilization of Process Oriented Guided Inquiry Learning (POGIL) in Tertiary Chemistry.

2. Promote the enthusiasm of Science teachers in improving the performance of their students.

3. Develop Learning Plans aligned with POGIL.

4. Encourage Science instructors to engage students in a more student-centered learning environment.

| Key Areas of Concern | Specific Objectives | Activities/Strategies | Persons Involved | Time Frame | Source of Fund | Success Indicator |
|---|---|---|---|---|---|---|
| *I. POGIL Overview* | A. Introduce Process Oriented Guided Inquiry Learning to Science Instructors. B. Examine the researches showing the implications of POGIL to student performances in Chemistry. C. Determine the possibilities of utilizing POGIL in Chemistry instruction in the Tertiary Level. | Research Analysis Brainstorming Video Presentation | Administrators Science instructors | Before the opening of the Semester | Department Funds | Demonstration of understanding of POGIL as teaching approach and strategy in teaching chemistry |

| | | Seminar | Administrators Science instructors Resource person | First Month of the semester | Department Funds Sponsorship | Complete understanding of POGIL as teaching approach and strategy in teaching chemistry |
|---|---|---|---|---|---|---|
| *II. POGIL Seminar* | A. Develop an in depth understanding of POGIL as an approach and strategy in Chemistry. B. Value the implications of POGIL in teaching Chemistry | | | | | |
| *III. POGIL Writeshop* | A. Craft POGIL activity plans to be utilized in the class. | Write shop | Administrators Science instructors Resource person | Second Month of the Semester | Department Funds Sponsorship | Development of POGIL activity plans. |
| *IV. POGIL Demonstration Teaching* | A. Execute the POGIL activity plans made during the Write shop. B. Apply the salient features of POGIL through demonstration teaching. | Demonstration teaching | Administrators Science instructors Demonstration teacher Students | Third Month of the Semester | Department Funds | Increased awareness of Science instructors of POGIL in teaching Chemistry. Create a student-centered atmosphere in learning. Provide more engagement of students in learning. |

# SUMMARY OF FINDINGS

1. **What is the pretest peformance of the two groups?**
   **1.1 Non-POGIL group?**
   **1.2 POGIL group?**

The Non-POGIL group garnered a mean performance of 10.67. On the other hand, the POGIL group got a mean performance of 11.30, which were both given verbal description of Below Average.

# SUMMARY OF FINDINGS

**2. What significant difference exists between the pretest performance of the Non-POGIL and POGIL Groups?**

The computed t-value which is 0.983 is lower than the tabular t-value which is 1.699, thus, there is no significant difference between the pretest results of the Non-POGIL and POGIL groups

# SUMMARY OF FINDINGS

3. **What is the posttest performance of the two groups?**
   **3.1 Non-POGIL group?**
   **3.2 POGIL group?**

The student-respondents of the Non-POGIL group had a mean performance of 13.07 in the posttest and 16.40 was the mean performance of the respondents in the POGIL group in the posttest, respectively.

# SUMMARY OF FINDINGS

**4. What significant difference exists between the posttest performance of the Non-POGIL and POGIL group?**

There is a significant difference between the posttest performance of the Non-POGIL and POGIL groups. With the computed t-value 4.609 that is greater than the tabular t-value of 1.699, POGIL can be asserted as an effective teaching approach in Tertiary Chemistry. This can further support the propositions of Gunn, Grigg and Pomahac (2007), Bailin (2002) and Thomson (2011) that the utilizaton of POGIL ushered the development of a better leaning environment to students.

# SUMMARY OF FINDINGS

**5. What significant difference can be noted between the pretest and posttest performance of the Non-POGIL group?**

The mean performance of the Non-POGIL group in the pretest and posttest were 10.53 and 13.07, respectively. The tabular value of 1.699 was lower than the computed t-value which was 4.616. Therefore, there is a significant difference between the pretest and posttest performances of the Non-POGIL group.

# SUMMARY OF FINDINGS

**6.  What significant difference can be noted between the pretest and posttest performance of the POGIL group?**

The mean pretest and posttest performances of the POGIL group 11.30 and 16.33, respectively. The tabular t- value which was 1.699 was comparably lower than the computed t-value which was 8.446 emphasized that there is a significant difference between the pretest and posttest performances of the student-respondents of the POGIL group. This result can further support the work of Hein (2012), wherein student performances of students were enhanced by POGIL in class.

# SUMMARY OF FINDINGS

**7. To what extent did the POGIL setting increased achievement of respondents in Tertiary Chemistry?**

The performance of the students changed significantly with regards to student-respondents who had been exposed to POGIL. This can be gleaned by the calculation of mean gain scores between the POGIL and the Non-POGIL groups. The computed t-value, 3.50, higher than the tabular value, thus led to the rejection of the null hypothesis.

# SUMMARY OF FINDINGS

**8. What action plan can be proposed to support the utilization of Process Oriented Guided Inquiry Learning (POGIL) in Tertiary Chemistry?**

The researcher crafted an Action Plan towards the utilization of Process Oriented Guided Inquiry Learning (POGIL) in Tertiary Chemistry. The plan includes the Rationale, General Objectives, Key Areas of Concern, Specific Objectives, Activities/Strategies, Persons Involved, Time Frame, Source of Fund and Success Indicator.

# CONCLUSION

Process Oriented Guided Inquiry Learning (POGIL) led to the achievement of student repondents in Inorganic Chemistry (Lecture).

Development of Process Skills which led to the improvement of their understanding of concepts as reflected by their posttest performances.

Lecture is evidently effective as gleaned on the posttest performances of the Non-POGIL group.

Student participation was maximized in the POGIL classroom.

In POGIL setting, students take part in the dynamism of the teaching-learning process.

# RECOMMENDATIONS

Teachers in the Tertiary level, especially in TEI's should promote utilization of varied teaching strategies, methods and approaches.

School administrators should provide ample avenues for teachers to be equipped with novel, time-tested and research-based instructional innovations.

Conduct a same study by which the time-span of the POGIL instruction will be longer and the coverage of topics would be wider in scope.

Conduct an experiment on POGIL implementation to other disciplines

Conduct a comparative study on the effectiveness of POGIL compared to relatively new approaches in teaching science.

# THANK YOU VERY MUCH!!!