EXPLORING FILIPINO STUDENTS’ CRITICAL THINKING SKILLS: BASIS FOR THE ENHANCEMENT OF SCIENCE LABORATORY CLASS DELIVERY

MR. RYAN V. LANSANGAN
Philippine Normal University
Figure 1. Timeline concurrent to Philippine Curriculum Development

- before 1500 (Pre-Spanish Colonial)
- 1521 - 1896 (Spanish Colonial)
- 1896 - 1898 (1st Republic)
- 1899 - 1935 (American Period)
- 1972 - 1986 (4th Republic)
- 1987 - 1999 (Post EDSA)
- 21st Century
K to 12

Kindergarten (6 Years)

Primary Education (6 Years)

Junior High School (4 Years)

Senior High School (2 Years)

Basic Education
### Philippine Average TIMSS Scores
*(Trends in International Mathematics and Science Study)*

<table>
<thead>
<tr>
<th></th>
<th>Scores</th>
<th>International Average</th>
<th>Rank</th>
<th>Participating Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2003 Results</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>332</td>
<td>489</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>Mathematics</td>
<td>358</td>
<td>495</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td><strong>HS II</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>377</td>
<td>473</td>
<td>43</td>
<td>46</td>
</tr>
<tr>
<td>Mathematics</td>
<td>378</td>
<td>466</td>
<td>34</td>
<td>38</td>
</tr>
<tr>
<td><strong>2008 Results</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Math</td>
<td>355</td>
<td>500</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

*Source: TIMSS, 2003 and 2008*
Studies also reveal the Filipino students’ low retention of science concepts, limited scientific reasoning and analytical skills and poor communication skills (UP NISMED, 2004).
The Philippines **must** catch up with the rest of the world.

<table>
<thead>
<tr>
<th>Country and Overall Rank</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Malaysia</td>
<td>24</td>
<td>26</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>32</td>
<td>28</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Thailand</td>
<td>36</td>
<td>38</td>
<td>39</td>
<td>38</td>
</tr>
<tr>
<td>Indonesia</td>
<td>54</td>
<td>44</td>
<td>46</td>
<td>50</td>
</tr>
<tr>
<td>Philippines</td>
<td>87</td>
<td>85</td>
<td>75</td>
<td>65</td>
</tr>
<tr>
<td>Vietnam</td>
<td>75</td>
<td>59</td>
<td>65</td>
<td>75</td>
</tr>
<tr>
<td>Cambodia</td>
<td>110</td>
<td>109</td>
<td>97</td>
<td>85</td>
</tr>
</tbody>
</table>

In ASEAN:

- **4th** in Quality of Education System
- **7th** in Quality of Primary Education
- **Last (8th)*** in Quality of Science & Math Education and Capacity for Innovation

*Loos, Myanmar, and Timor-Leste are not included in the survey.
BACKGROUND
To Liu (2014), critical thinking is one of higher order thinking skills and it is believed to play a central role in problem solving. Gunn et al. (2014) enumerated aspects of critical thinking; namely, conceptualizing, applying, analyzing, synthesizing, evaluating information gathered or generated by observation, experience, reflection, reasoning, or communication.
These critical thinking skills mirror the science process skills being developed in science teaching such as the components of scientific method.
RESEARCH OBJECTIVE

This study aimed to explore the extent of critical thinking skills of Filipino secondary school students deemed to develop through their experiences in the science laboratory classes, so as to acquire insights that can contribute to some enhancements in the science laboratory class delivery.
The present study was carried out in a private sectarian secondary school in Manila.
The participants included 300 junior high school students who are on their 10th grade under the K to 12 curriculum of the Department of Education.
It utilized descriptive survey exploring the critical thinking skills of students using the modified survey questionnaire adapted from two sections of Youth Life Skills Survey created by Mincemoyer, Perkins, and Numyua (2001).
This included 29 items online survey that explore students’ use of skills or approaches associated with critical thinking skills divided into six aspects namely: gathering information and supporting position, planning and organizing information, openness to different ideas, goal setting, making connections and analyzing experiment results.
Open-ended questions relevant to each of the aspects were also given to solicit the specific responses of the students pertaining to how critical thinking skills are being demonstrated.
Significance of gathering information in supporting the observations and findings in the experiment.

Utilization of multiple sources of information in interpreting experiment results and drawing conclusions.
Use of strategy such as checklist in understanding the problem in the experiment.

Strategizing and planning the sources on when to get relevant information related to the experiment.
Factor 3: Openness to Different Ideas

Keeping an open mind to different ideas when making a conclusion about the experiment.

Awareness that sometimes there are no right or wrong answers to a question related to the experiment.
Looking at the steps needed to accomplish the objectives of the laboratory experiment.

Breaking down the goal in steps.
Gathering and organizing information to formulate a position or perspective.

Factor 5: Making Connections

Lack of post lab activity that tackles the significance of the experiment – personally, locally, nationally, or globally.
Factor 6: Analyzing

Use of existing knowledge to generate new ideas or solve an unfamiliar problem related to the experiment.

Breaking down complex concepts. Using models and visuals in representing complex ideas.
Comparison of the Six Aspects

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gathering Information and Supporting Position</td>
<td>3.58</td>
<td>SA 0.58</td>
</tr>
<tr>
<td>2. Planning and Organizing Information</td>
<td>3.06</td>
<td>A 0.89</td>
</tr>
<tr>
<td>3. Openness to Different Ideas</td>
<td>3.66</td>
<td>SA 0.58</td>
</tr>
<tr>
<td>4. Goal Setting</td>
<td>3.52</td>
<td>SA 0.60</td>
</tr>
<tr>
<td>5. Making Connections</td>
<td>3.20</td>
<td>A 0.79</td>
</tr>
<tr>
<td>6. Analyzing</td>
<td>3.26</td>
<td>A 0.77</td>
</tr>
</tbody>
</table>

X = mean, Q = qualitative description, SD = standard deviation
1. Focus on students’ organization of ideas and information to understand the experiment;
2. Exercise and critical enhancement of students’ openness to multiple ideas available;
3. Consideration of the contextual connections of experiments being performed; and
CONCLUSION

The exploratory study has shown that students seem to be quite agreeing with some aspects of critical thinking but they appear to have a slightly limited exposure into it. The role of planning, gathering and organizing information and connecting it to laboratory activities pose as an opportunity for the students to be become active participants in the exercise of critical thinking. In a digital world where learners of science are widely exposed to a variety of information, the connectedness and appropriateness of students’ ideas to scientific investigations is also a determinant of the extent of their critical thinking in analyzing scientific evidence gathered from the experiments.
RECOMMENDATION

In light of the findings of this study, the researcher is recommending for future investigation to have a review of the existing format of laboratory manuals in the Philippines in terms of its capability to gauge the critical thinking of science students; explore how the teacher process students laboratory works in terms of critical thinking strategies; examine the use of some teaching-learning models in eliciting critical thinking skills in the science laboratory classes; and explore how inquiry-based learning is being practiced in the laboratory activities of science students in the Philippines.
MR. RYAN V. LANSANGAN

Faculty
University of Santo Tomas

Graduate Student
Philippine Normal University

rvlansangan@ust.edu.ph
Thank You!