The Effect of a Themed Learning Community on Physics Students’ Performance on the Force Concept Inventory

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Introduction

Characteristics of Themed Learning Community (TLC)

<table>
<thead>
<tr>
<th>Class size</th>
<th>Students’ Major</th>
<th>Year</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLC</td>
<td>Unified Engineering</td>
<td>Freshman</td>
<td>Related conjugate classes</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td></td>
<td>First semester TLC Calculus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TLC General Physics I</td>
</tr>
<tr>
<td>Non-TLC</td>
<td>Various Engineering</td>
<td>Different</td>
<td>Unrelated conjugate class</td>
</tr>
<tr>
<td>Large (100-150)</td>
<td>Freshman Junior Sophomore Senior</td>
<td></td>
<td>Calculus I Physics I Differential Eq.</td>
</tr>
</tbody>
</table>

Demographic Comparison

Q. Are they the same students?

TLC Student (Fall 2014) vs. Non-TLC Student (Fall 2014)


Method

Which data should we compare?

ACT Score Distribution (2011-2014 Freshman) TLC vs. Non-TLC

ACT Score Distribution (2011-2014 Freshman) TLC vs. Non-TLC

Percent of number of Students (%)

# of TLC students = 69 # of Non-TLC students = 160

Data Collection

FCI Pre-test Administration

Semester of lecture

FCI Post-test Administration

Simple Gain

V.S.

Normalized Gain

Gain = Post test – Pre test

Gain = \( \frac{Max \ Score \ – \ Pre \ test}{Max \ Score} \)

Ex. Pre = 10, Post = 20

Simple gain will be

20 – 10 = 10

Ex. Pre = 20, Post = 30

Simple gain will be

30 – 20 = 10

Normalized gain will be

\( \frac{20 - 10}{30 - 20} = 0.5 \)

\( \frac{30 - 20}{30 - 20} = 1 \)

Result

FCI Normalized Gain Distribution TLC vs. Non-TLC

Percent of number of Students (%)

FCI Score

TLC vs. Non-TLC

Nearly Same Performance on ACT

High performance in post test vs. pre test

Every TLC students gained higher or same score in post test than pre test

# of TLC students = 18 # of Non-TLC students = 42

Discussion

- TLC Students performed much higher in FCI than Non-TLC Students
- Professors in TLC & Non-TLC are different, which can cause difference in performance
- For the further study, we will examine the FCI score of algebra based physics, and test score of TLC calculus students to explore the reason why TLC students performed better
- This research is significant because it tells us the factors that can be used to improve student learning in introductory physics course

Acknowledgement

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