4th Annual Public Policy Conference
Philippine Institute for Development Studies
September 19, 2018, Mandaluyong, Metro Manila

Facing the FIRe with WAATER

M. Victoria Carpio-Bernido
* Research Center for Theoretical Physics
Central Visayan Institute Foundation, Jagna, Bohol
* University of San Carlos, Cebu City
* Mindanao State University – Iligan Institute of Technology
Iligan City

CONTEXT (APPC)

Workers with less education and fewer skills are likely to be at a disadvantage as the FIRe progresses…need to adapt to the changing nature of work by making investments in training people to have both soft skills and technical competencies.

QUESTIONS

- What critical policy decisions and strategic actions should the country be taking today to get the current and future work force ready for FIRe?

QUESTIONS

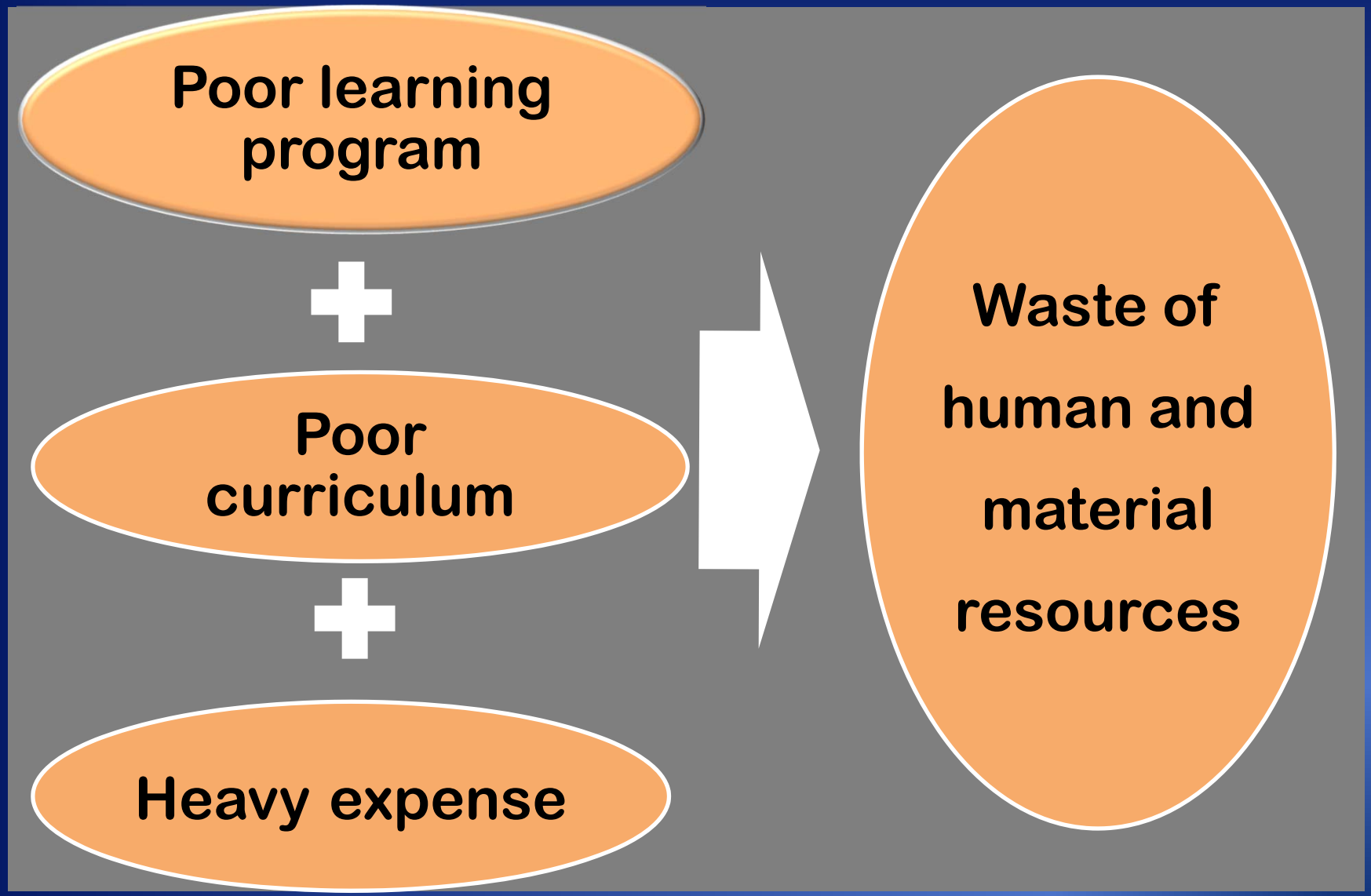
- What can (and should) be done so that Filipino workers and the young who are now lagging behind in human capital development are able to catch up and move ahead amidst labor market challenges and opportunities?

KEY POINTS

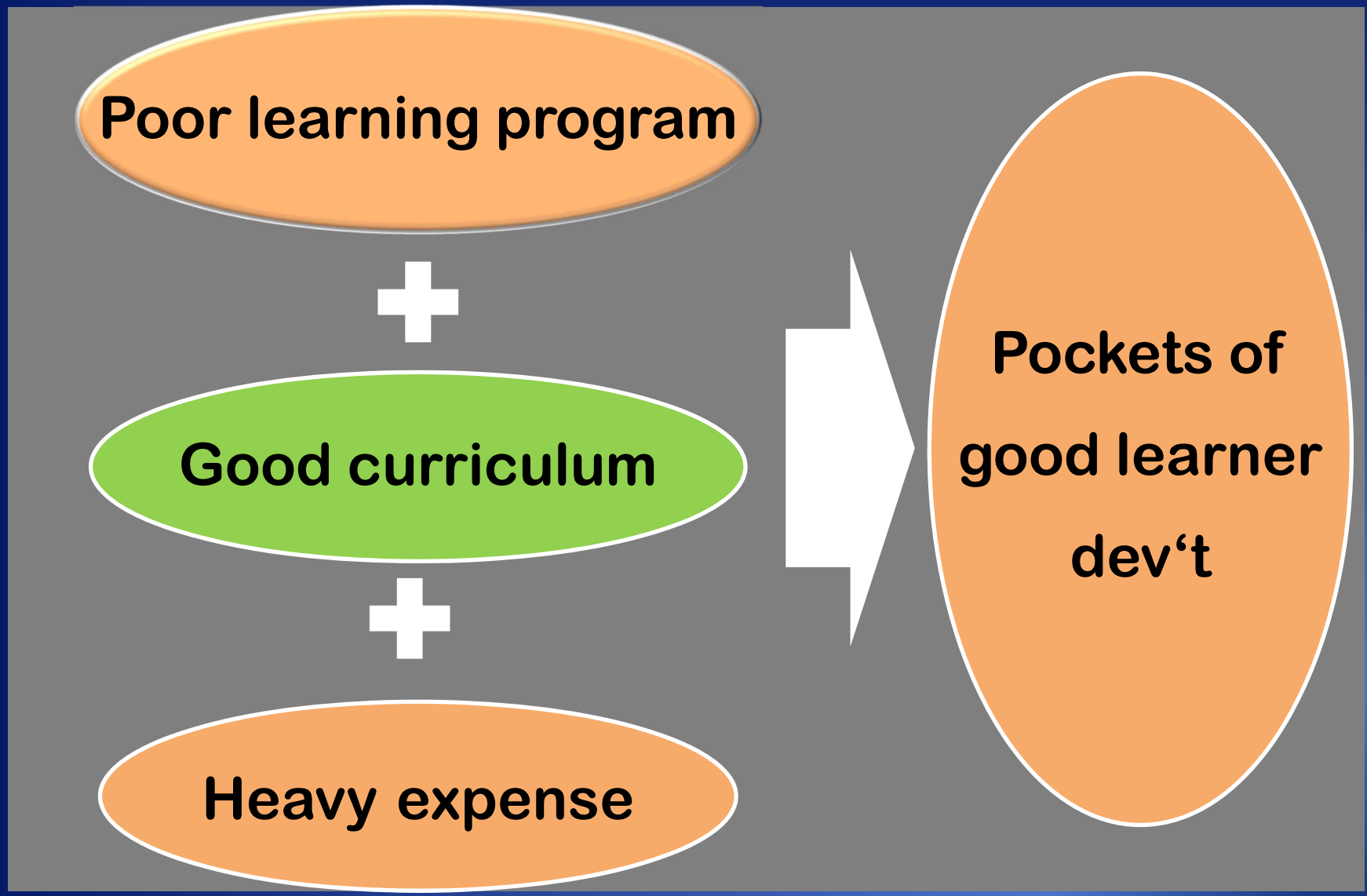
- Critical Choices:
  - Curriculum content and depth
  - Learning program and materials
  - Budget optimization
- WAATER:

  Wide-ranging **A**dvanced **A**nalytics **T**raining and **E**ducation **R**einforcement
  - Prototype: The CVIF Experience

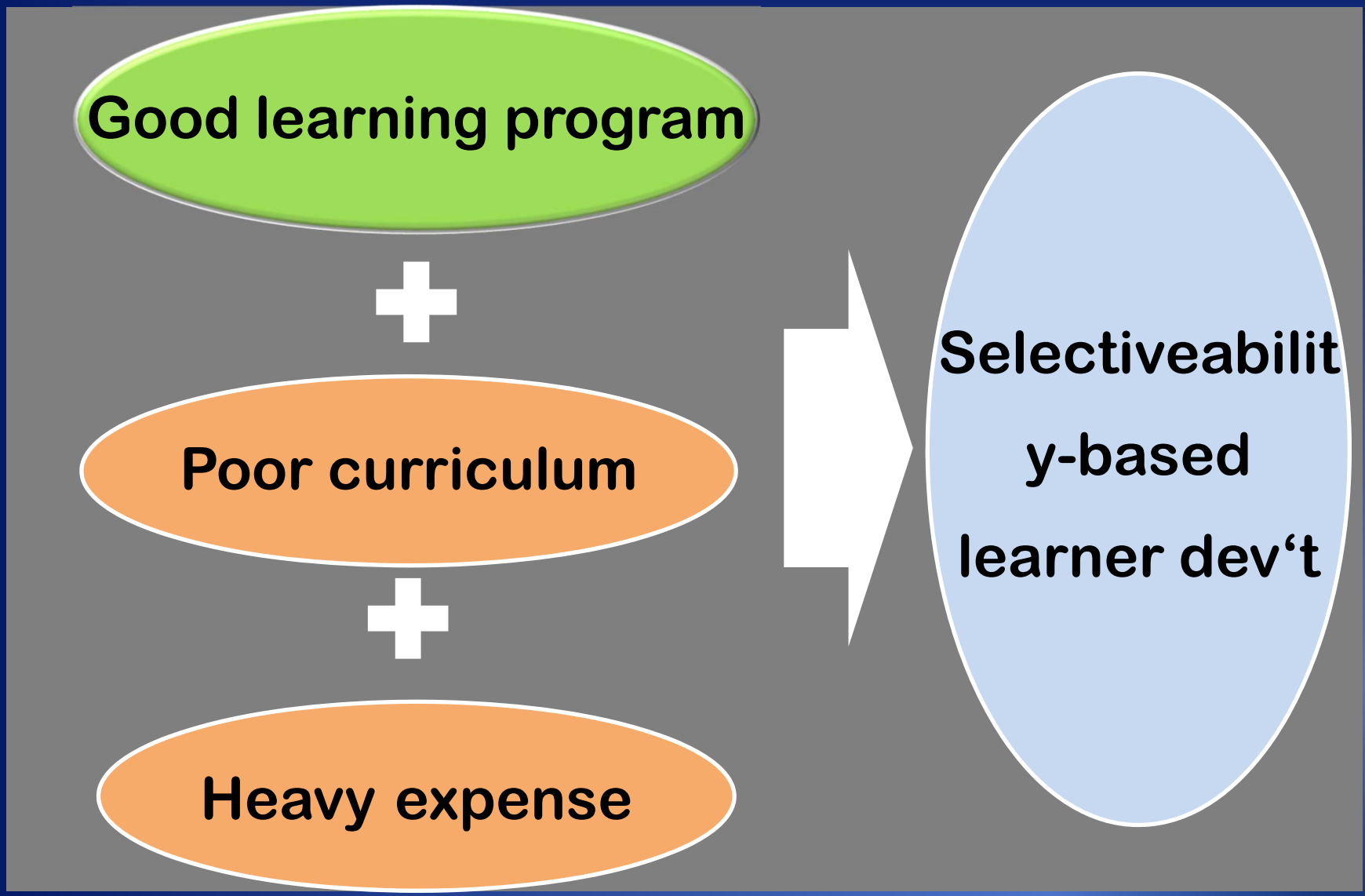
Critical choices



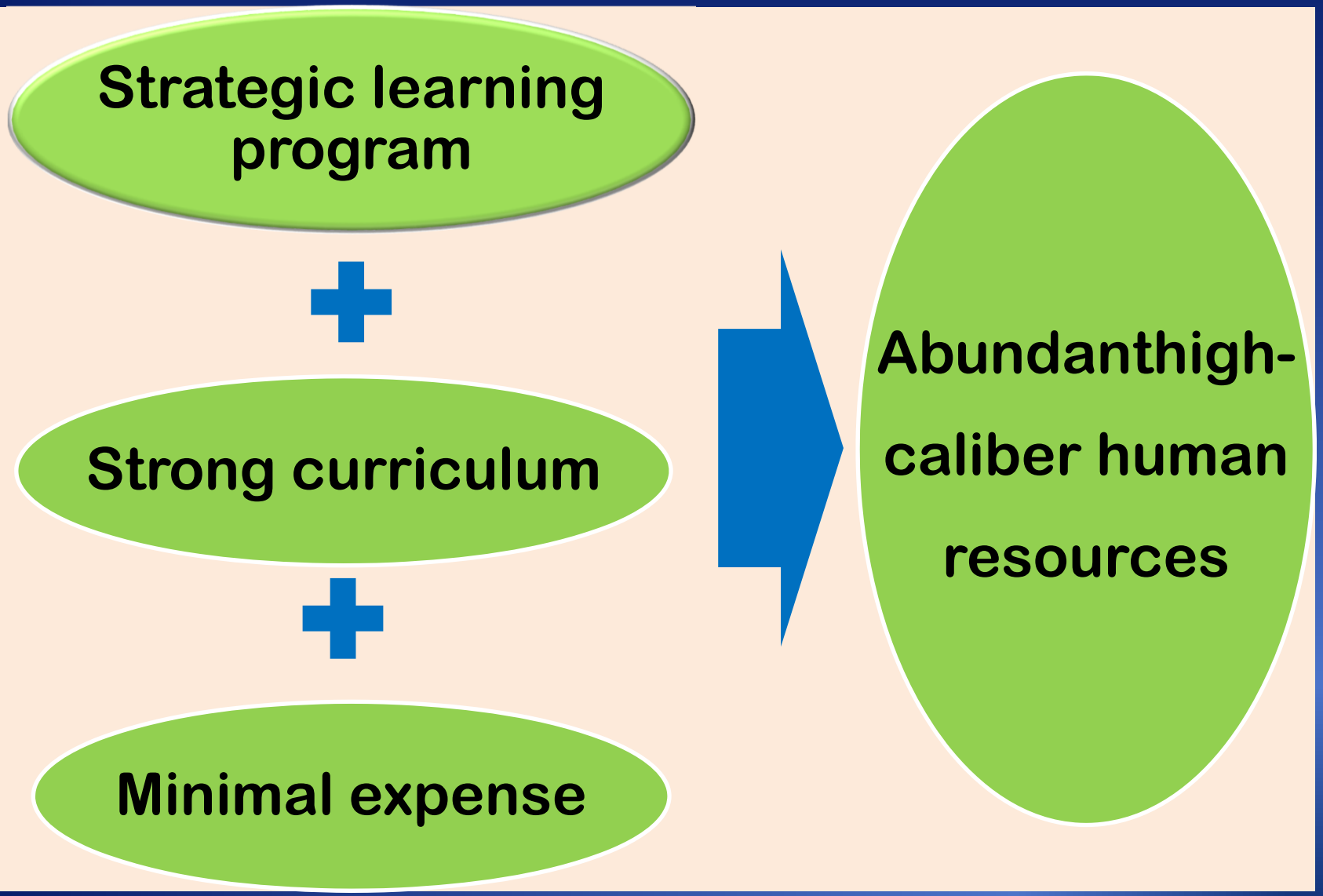
Critical choices



Critical choices



Critical choices



WAATER:

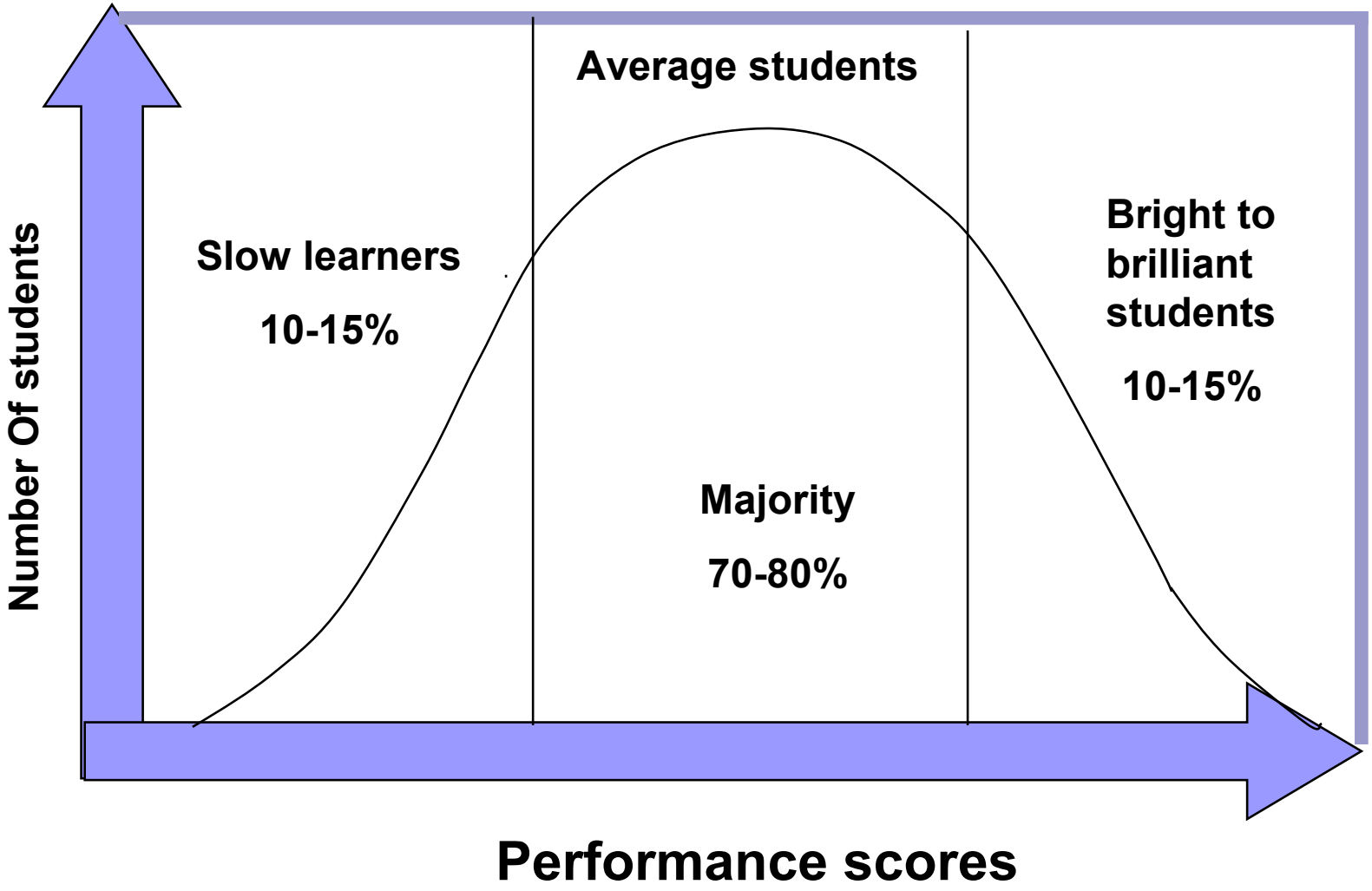
Wide-ranging Advanced Analytics Training and Education Reinforcement

Wide-ranging

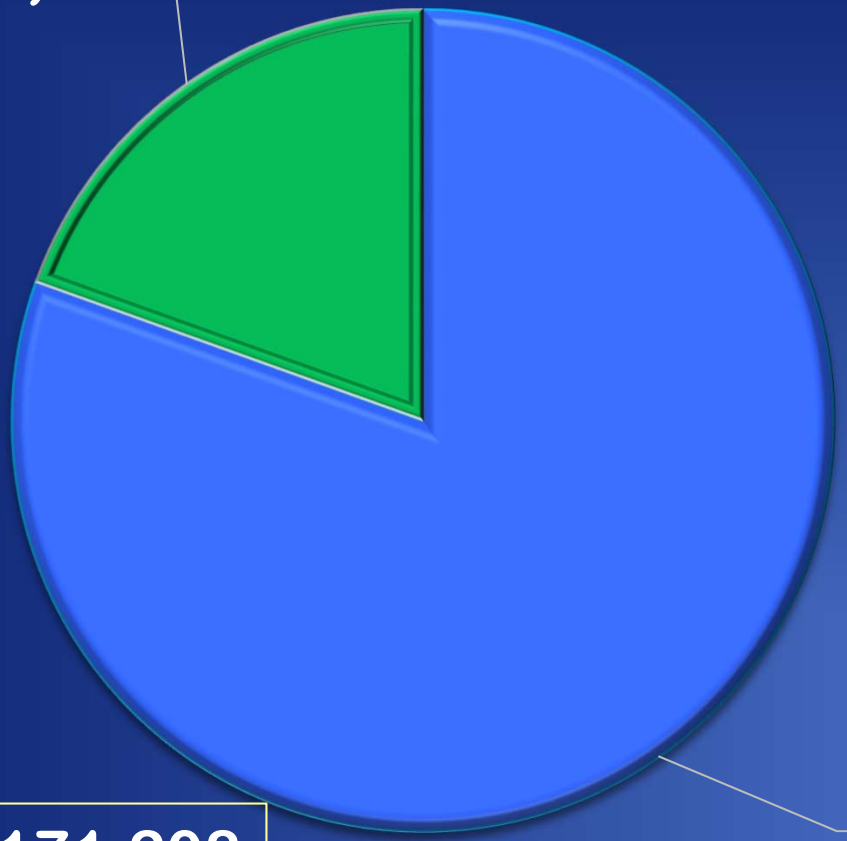
Wide-ranging

- Extensive in scope
  - Demographical and anthropological distribution
  - Disciplines for long-haul training
  - Transnational

Addressing the whole spectrum:



Secondary Schools Enrollment
SY 2013-2014



Public

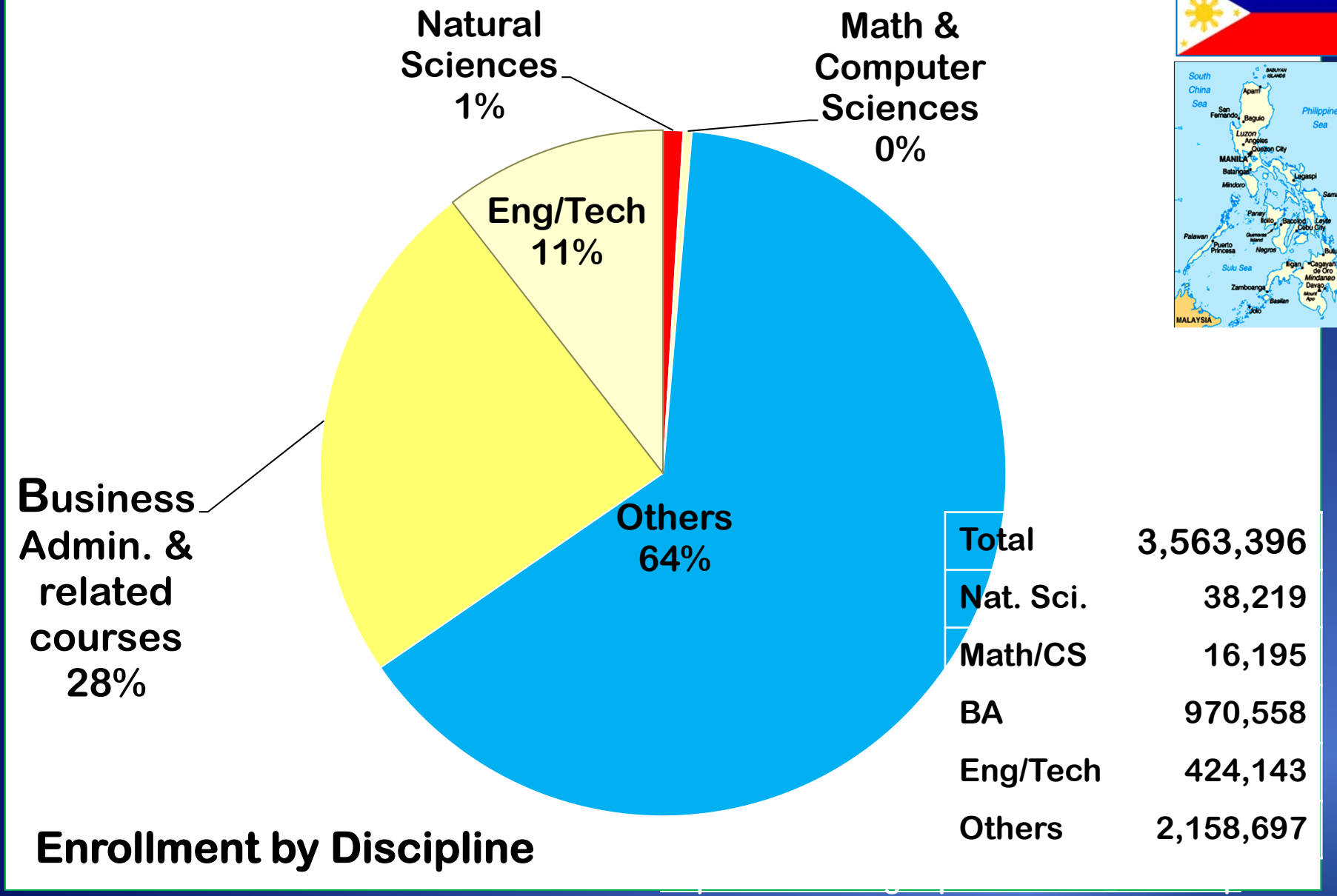
Private

TOTAL: 7,171,208

http://www.nscb.gov.ph/secstat/d_educ.asp

Common problems

- Boosting interest in science, technology, engineering and math (STEM) courses
- Sustaining interest and passing grades throughout a university course
- Patching up deficiencies in mathematical preparation



Total	3,563,396
Nat. Sci.	38,219
Math/CS	16,195
BA	970,558
Eng/Tech	424,143
Others	2,158,697

Enrollment by Discipline

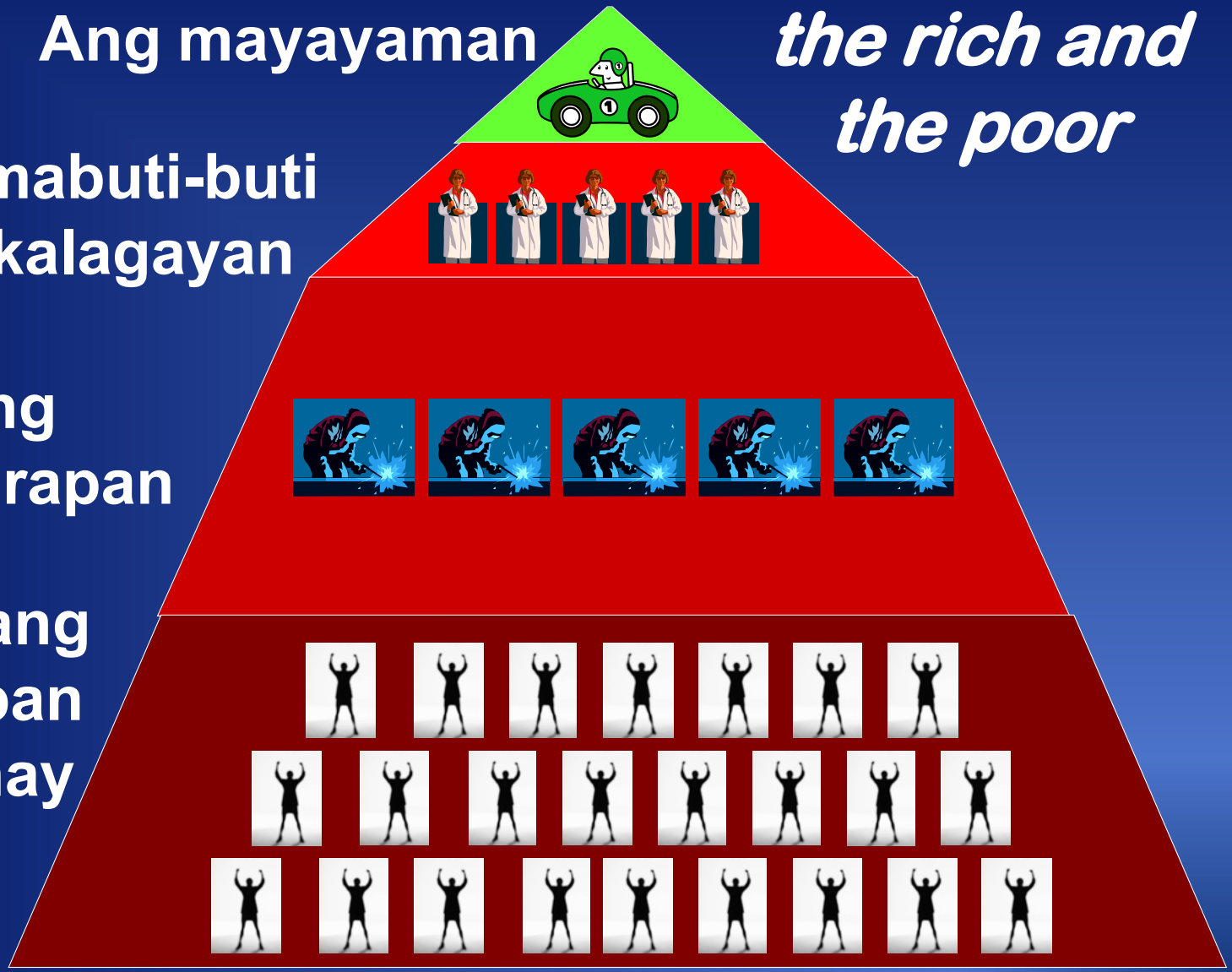
The gap between the rich and the poor

Ang mayayaman

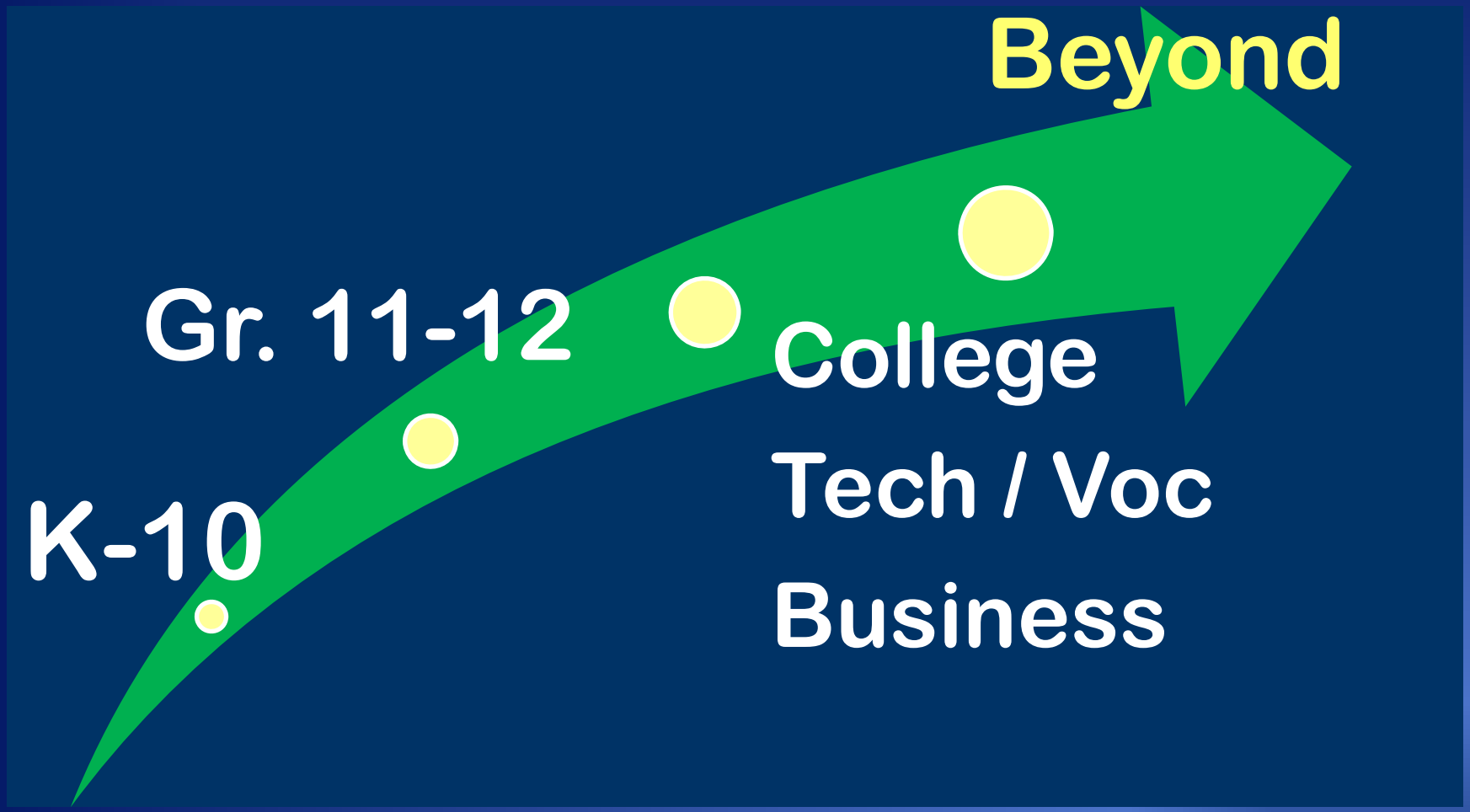
Ang mabuti-buti ang kalagayan

Ang nahihirapan

Grabe ang kahirapan ng buhay



Advanced


Beyond
Gr. 11-12
College
Tech / Voc
Business
K-10

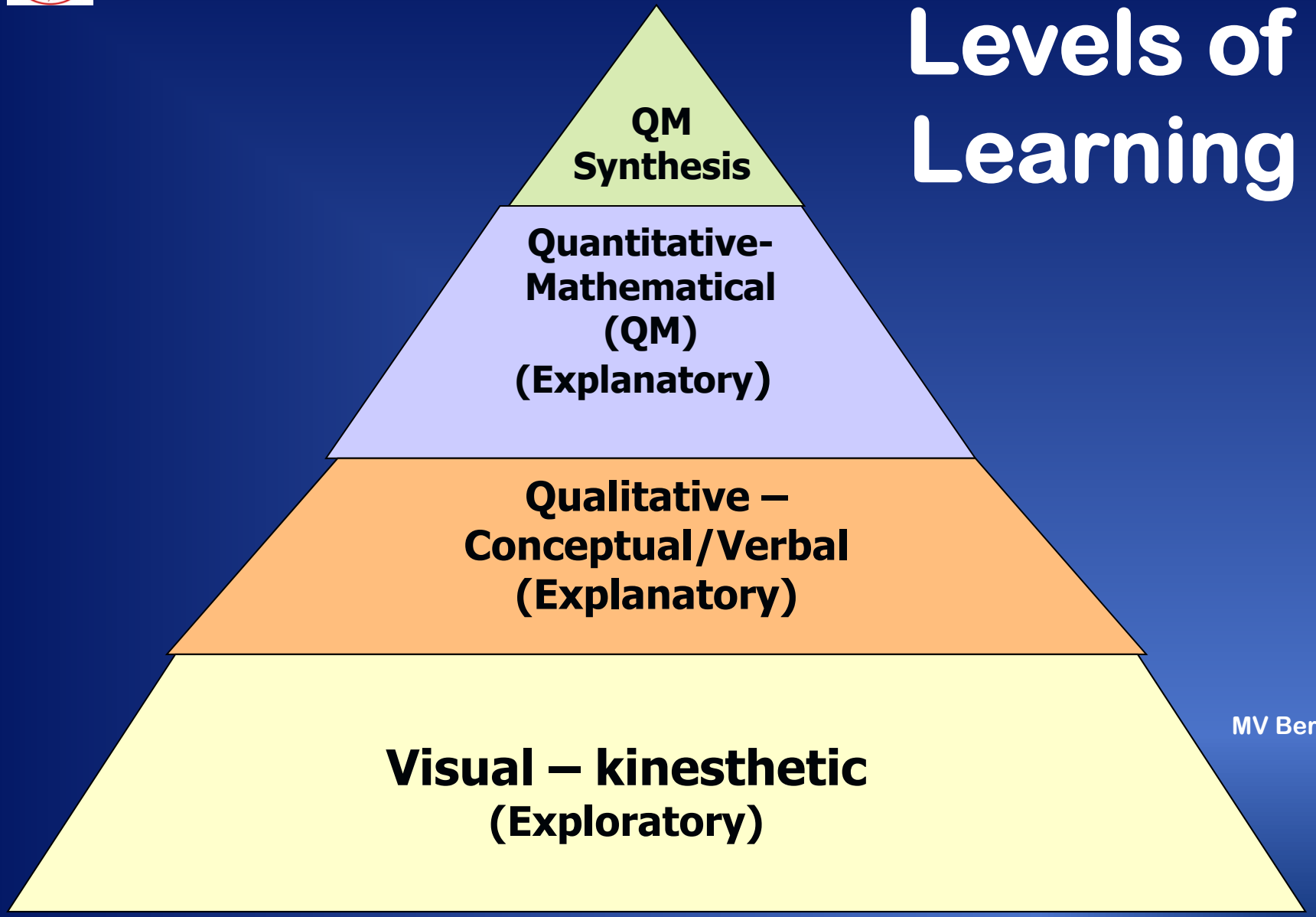
Analytics Training

Math infused disciplines

- Physics, Chemistry, Biology, Earth Sciences
- Economics, Political Science, Sociology,…
- Humanities and Arts
- Sports and Kinetics
- Computational methods
- Design and engineering

Education Reinforcement

Levels of Learning



MV Bernido,
2005

Analytics training

- Conceptual level
- Verbal level
- Mathematical level

WAATER:

Web Adapted Analytics Training and Education Reinforcement

The CVIF Dynamic Learning Program

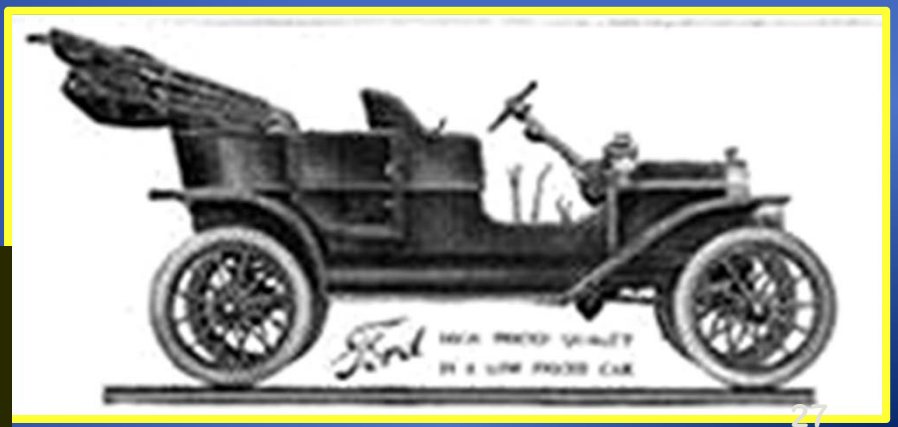
- a systems approach to process-induced learning
- applied at the elementary, secondary, and tertiary levels

Carpio-Bernido, M. V., Bernido, C. C. (2004) *Science Culture and Education for Change, Part I: Innovative Strategies for Secondary Education in the Philippines*. In Transactions of the National Academy of Science and Technology (NAST), Philippines, Vol. 26, No. 2; (2011) *CVIF Dynamic Learning Program: A Systems Approach to Process-Induced Learning*. In Proc. of the epiSTEME 4 (Mumbai:Homi Bhabha Center for Science Education).

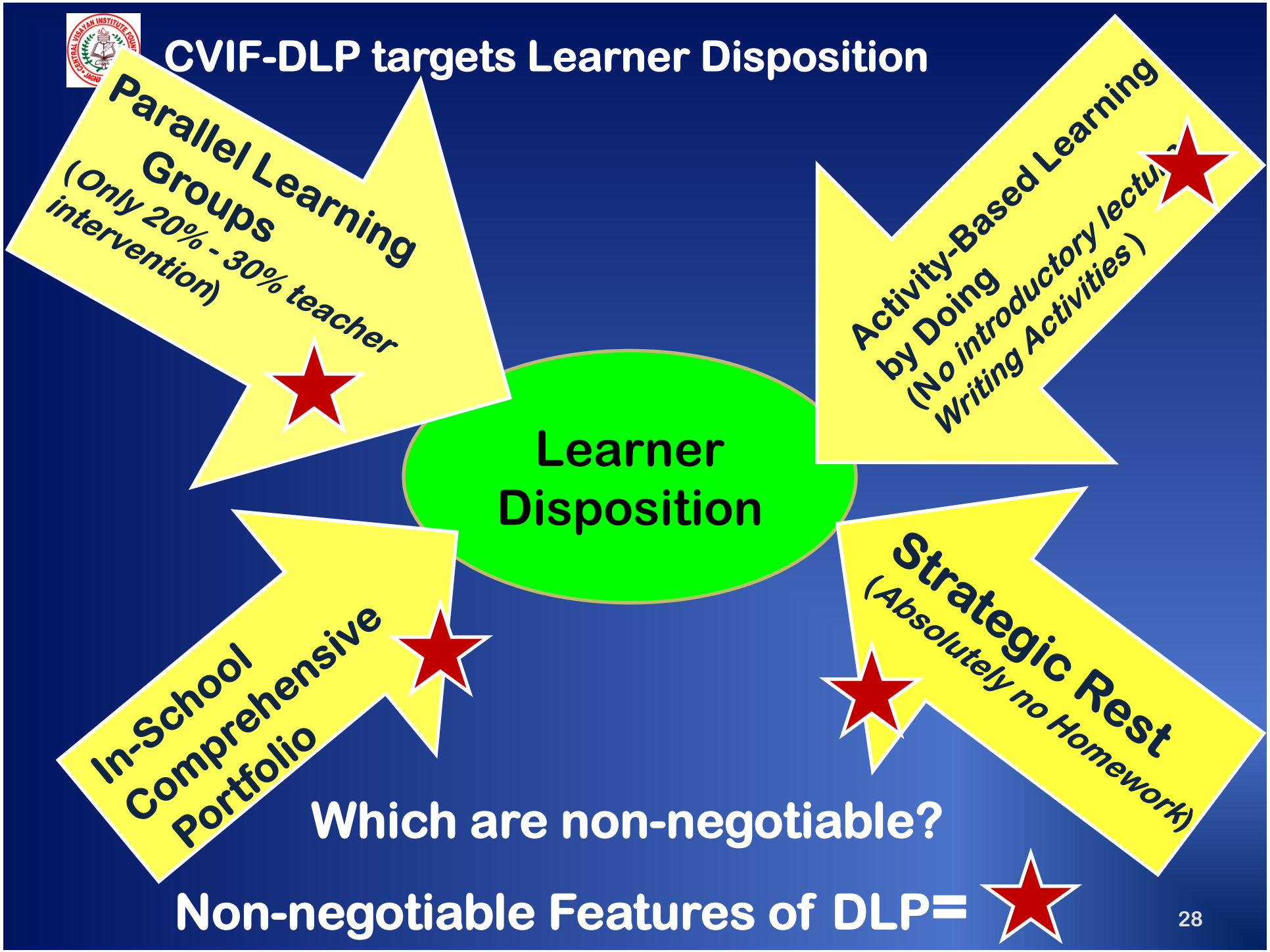
CVIF Program Design Requirements

- ***large-scale*** enough for ***state school systems***, but ***individualized*** enough for ***each student in any school***
- has best ***evidence-based features***, for curriculum and didactics
- so low in ***cost*** that effective implementation is possible for ***any nation.***

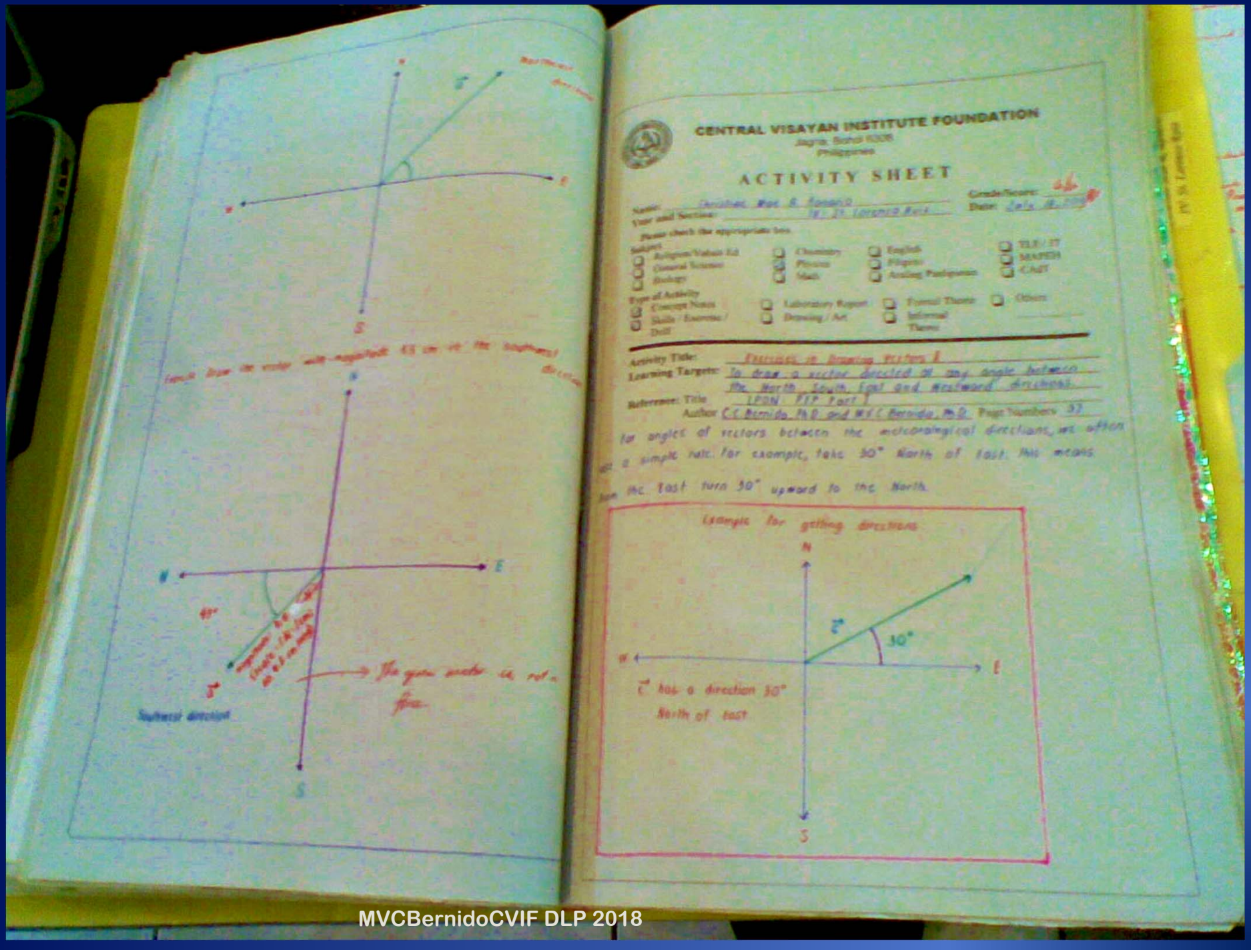
Ford's Model T: iconic disruptive showcase; Key: Process Efficiency

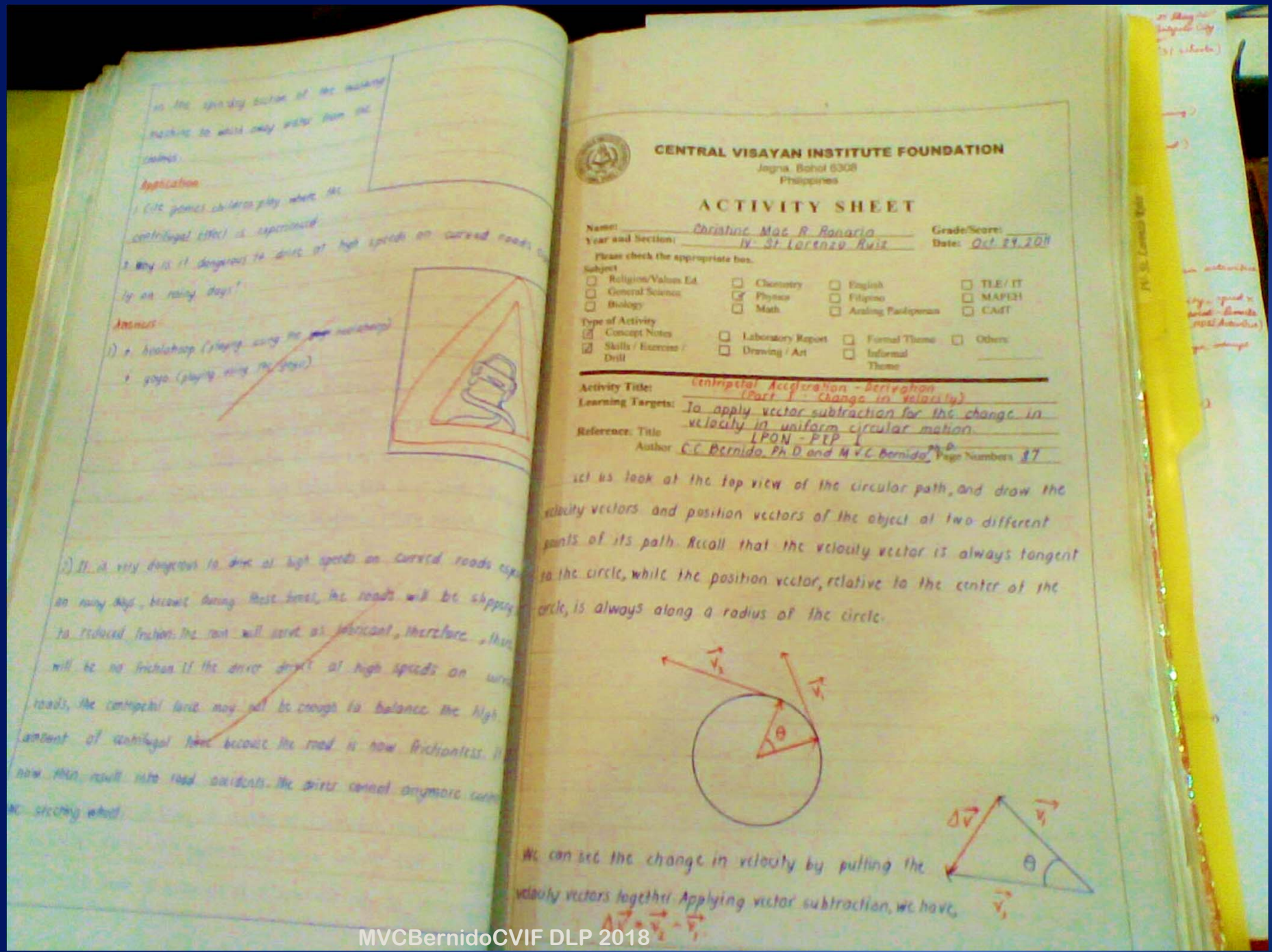


"1908 Ford Model T" by User Rmhermen on en.wikipedia (1908 Ford Model T ad from Oct. 1, 1908 Life magazine). Licensed under Public Domain via Commons - https://commons.wikimedia.org/wiki/


CVIF-DLP targets Learner Disposition
Parallel Learning Groups
(Only 20% - 30% teacher intervention)
Activity-Based Learning by Doing
(No introductory lectu
Writing Activities)
Learner Disposition
In-School Comprehensive Portfolio
Strategic Rest
(Absolutely no Homework)
Which are non-negotiable?
Non-negotiable Features of DLP=

- No need for homework, assignments, required research, and projects to be done at home
- No need for tutoring after school hours
- More time for holistic development


CENTRAL VISAYAN INSTITUTE FOUNDATION
Jagna, Bohol 6308
Philippines
ACTIVITY SHEET
Name: Christine Mae R. Ranario
Year and Section: IV - St. Lorenzo Ruiz
Grade/Score:
Date: July 18, 2018
Please check the appropriate box.
Subject
Religion/Values Ed
General Science
Biology
Chemistry
Physics
Math
English
Filipino
Analog Pasiguman
TLE / IT
MAPEH
CAdT
Type of Activity
Concept Notes
Skills / Exercise / Drill
Laboratory Report
Drawing / Art
Formal Theme
Informal Theme
Others
Activity Title: Exercises in Drawing Vectors I
Learning Targets: To draw a vector directed at any angle between the North, South, East and Westward directions.
Reference: Title LPDN: PTP Part I
Author C.C. Bernido, Ph.D. and M.V.C. Bernido, Ph.D. Page Numbers 33
for angles of vectors between the meteorological directions, we often use a simple rule. For example, take 30° North of East. This means from the East turn 30° upward to the North.
Example for getting directions
N
W
E
S
30°
c has a direction 30° North of East
Southwest direction
N
W
E
S
45°
The given vector is not a force



in the spin-dry section of the washing machine to wash away water from the clothes.

Application

1. Cite games children play where the centrifugal effect is experienced.

2. Why is it dangerous to drive at high speeds on curved roads, especially on rainy days?

Answers

1) + hoolahoop (playing using the hoolahoop)

+ yoyo (playing using the yoyo)

2) It is very dangerous to drive at high speeds on curved roads especially on rainy days, because during these times, the roads will be slippery to reduced friction. The rain will serve as lubricant, therefore, there will be no friction. If the driver drives at high speeds on curved roads, the centripetal force may not be enough to balance the high amount of centrifugal force because the road is now frictionless. If now then result into road accidents. The driver cannot anymore control the steering wheel.

CENTRAL VISAYAN INSTITUTE FOUNDATION
Jagna, Bohol 6308
Philippines

ACTIVITY SHEET

Name: Christine Mae R. Ranaria
Year and Section: IV- St. Lorenzo Ruiz
Grade/Score:
Date: Oct 24, 2011

Please check the appropriate box.

Subject
- ☐ Religion/Values Ed.
- ☐ General Science
- ☐ Biology
- ☐ Chemistry
- ☑ Physics
- ☐ Math
- ☐ English
- ☐ Filipino
- ☐ Araling Pasipunan
- ☐ TLE / IT
- ☐ MAPEH
- ☐ CAdT

Type of Activity
- ☑ Concept Notes
- ☑ Skills / Exercise / Drill
- ☐ Laboratory Report
- ☐ Drawing / Art
- ☐ Formal Theme
- ☐ Informal Theme
- ☐ Others:

Activity Title: Centripetal Acceleration - Derivation (Part I: Change in velocity)

Learning Targets: To apply vector subtraction for the change in velocity in uniform circular motion.

Reference: Title LPON - PIP I
Author C.C. Bernido, Ph.D. and M.V.C. Bernido, Ph.D. Page Numbers 87

Let us look at the top view of the circular path, and draw the velocity vectors and position vectors of the object at two different points of its path. Recall that the velocity vector is always tangent to the circle, while the position vector, relative to the center of the circle, is always along a radius of the circle.

We can see the change in velocity by putting the velocity vectors together. Applying vector subtraction, we have,

$\Delta\vec{v} = \vec{v}_2 - \vec{v}_1$

MVCBernidoCVIF DLP 2018

Application:

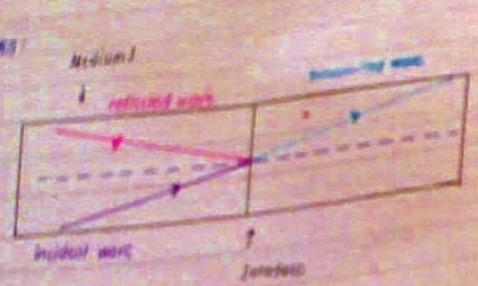
1. The diagram at the right shows the side view of two media and their interface. Draw and label rays for incident, reflected and transmitted waves.

SIDE VIEW

2. Give examples of different media with an interface through which a wave propagates.

ANSWERS:

1)



2) • Duplex house — Medium 1: house 1; Medium 2: house 2; Interface: wall that divides them

• Ham Sandwich — Medium 1: loaf 1; Medium 2: loaf 2; Interface: Ham

CENTRAL VISAYAN INSTITUTE FOUNDATION
Jagna, Bohol 6308
Philippines

ACTIVITY SHEET

Name: Christine Mae R. Bonaria
Year and Section: IV St. Lorenzo Ruiz
Grade/Score: 9/10
Date: Feb. 17, 2014

Please check the appropriate box.

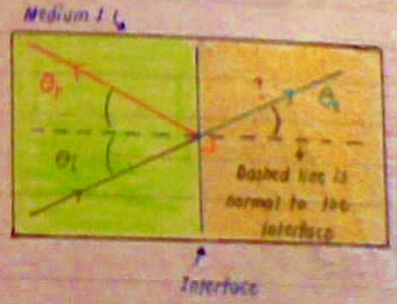
Subject
- ☐ Religion/Values Ed
- ☐ General Science
- ☐ Biology
- ☐ Chemistry
- ☑ Physics
- ☐ Math
- ☐ English
- ☐ Filipino
- ☐ Araling Panlipunan
- ☐ TLE/ IT
- ☐ MAPEH
- ☐ EsAt

Type of Activity
- ☑ Concept Notes
- ☑ Skills / Exercise / Drill
- ☐ Laboratory Report
- ☐ Drawing / Art
- ☐ Formal Theme
- ☐ Informal Theme
- ☐ Others

Activity Title: Reflection and Refraction at a Boundary
Learning Targets: To state and apply the law of reflection and law of refraction.

Reference: Title: LPDN - PEP II
Author: C.C. Bernido, Ph.D.; M.V.C. Bernido, Ph.D.
Page Numbers: 174

SIDE VIEW

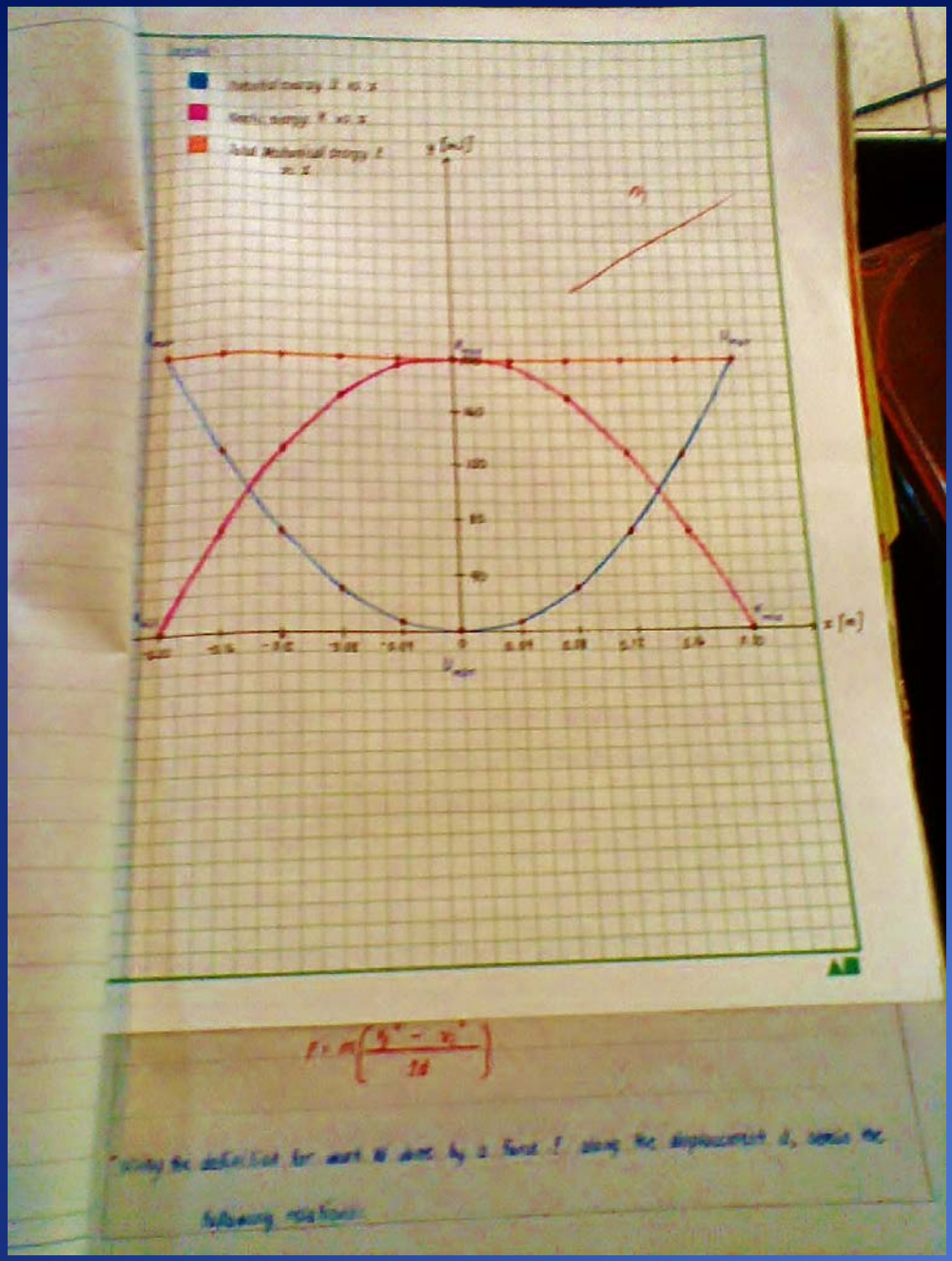


Notation:

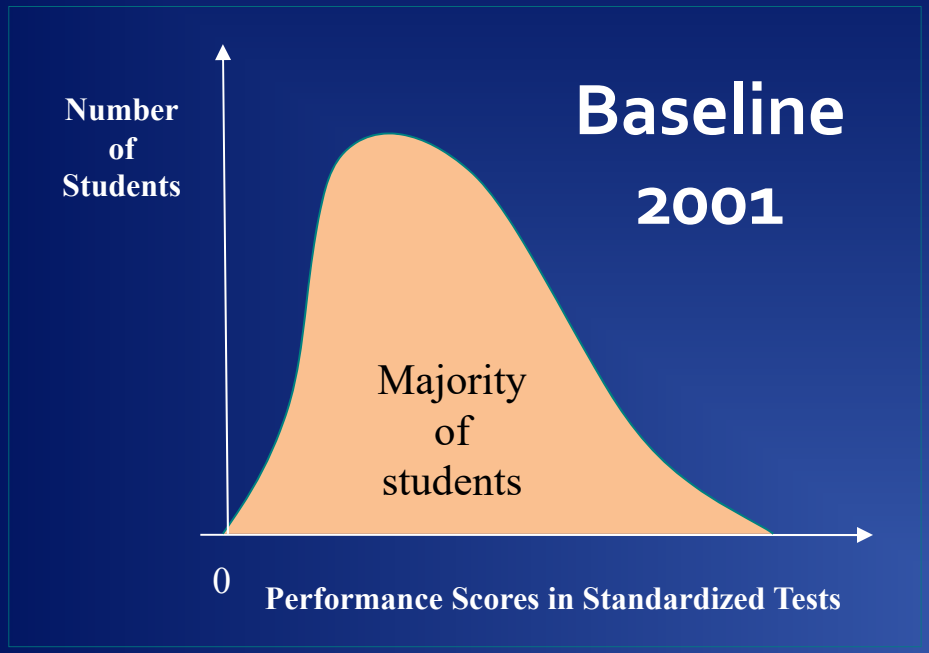
θ_i : angle of incidence
(between the direction of the incident wave and the normal to the interface)

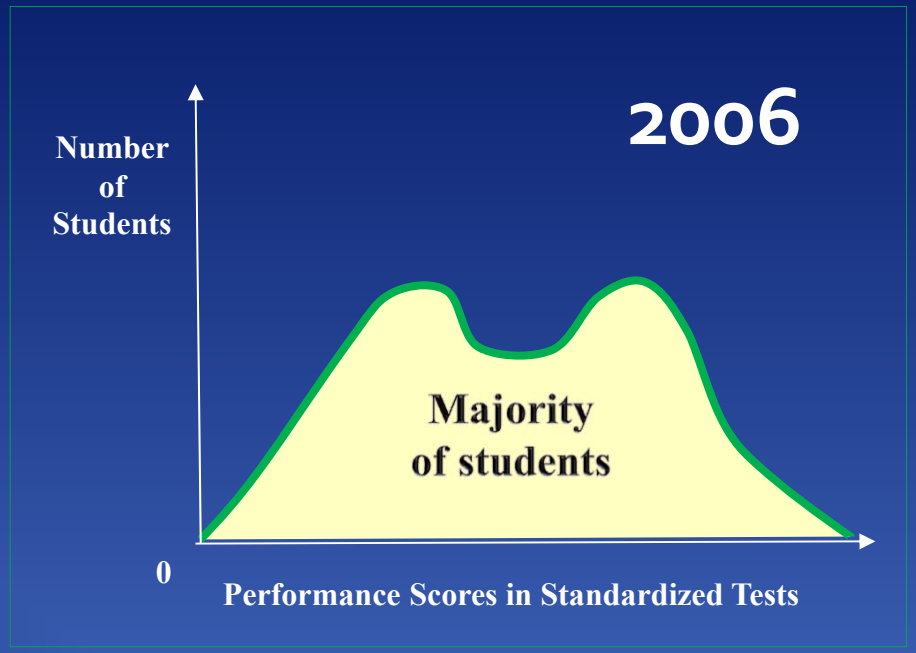
θ_r : angle of reflection
(between the direction of the reflected wave and the normal to the interface)

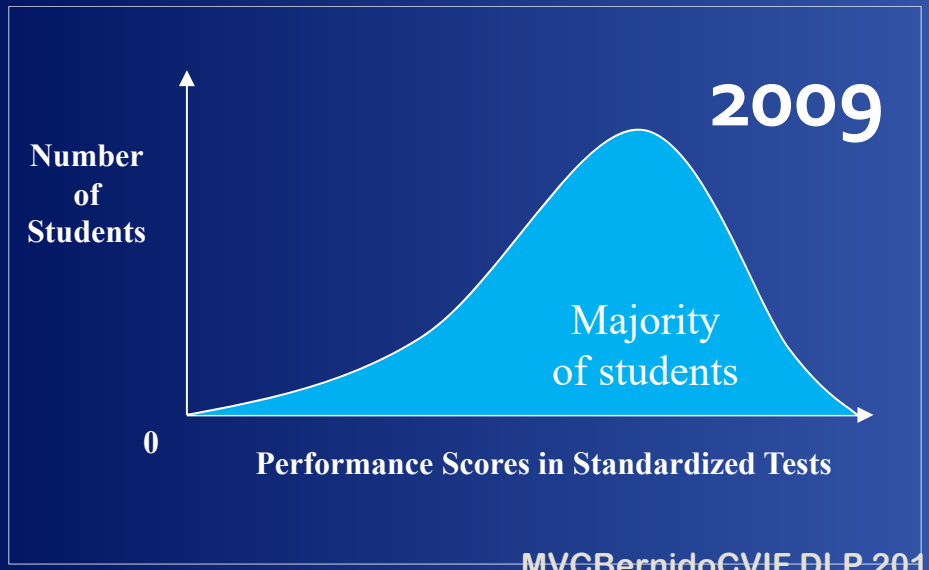
θ_t : angle of refraction
(between the direction of the transmitted wave and the normal to the interface)

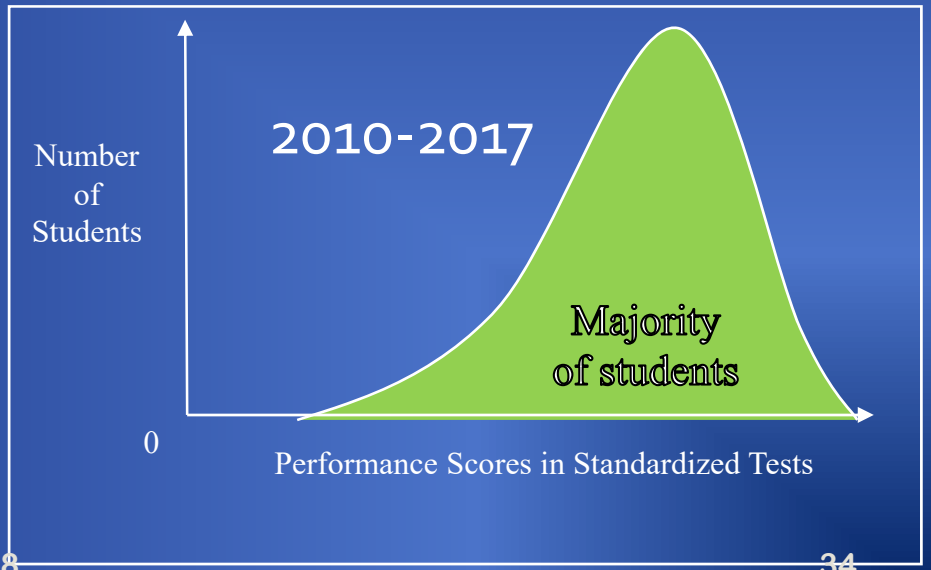


Sample Performance Indicators: NSAT/ NCAE/NAT









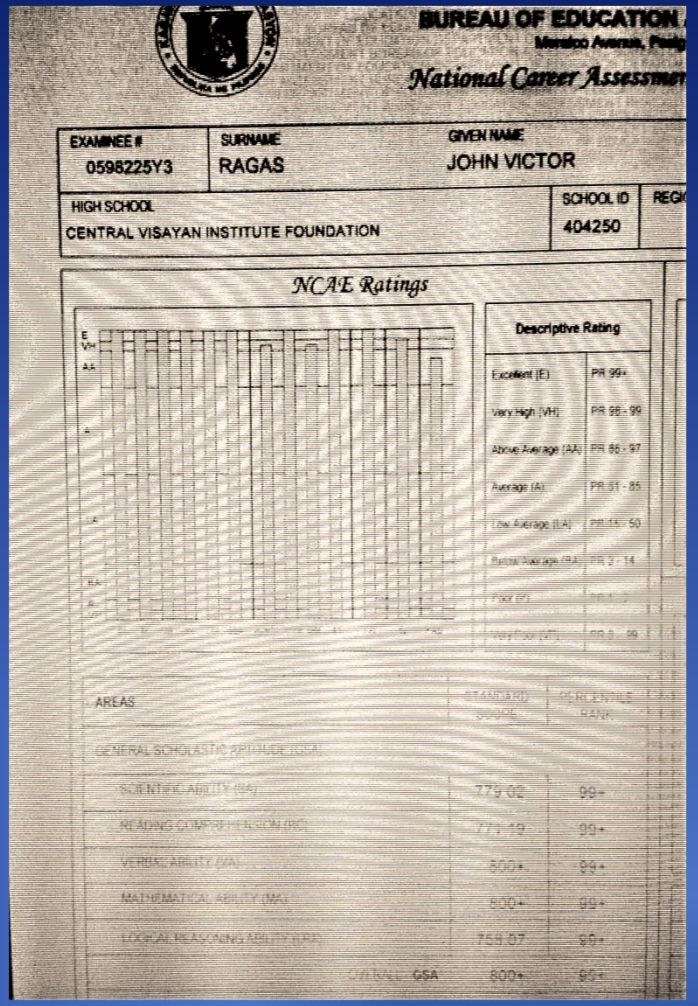
CVIF Grade 9 students, SY 2016 – 2017

99 - 99+ PR

- 34 students in MATH (16 %)
- 30 students in SCIENTIFIC ABILITY (14 %)
- 31 students in Overall GENERAL SCHOLASTIC APTITUDE (GSA) (15 %)

John Victor A. Ragas

	Standard Score	Percentile
Scientific Ability	779.02	99+
Reading Comprehension	771.09	99+
Verbal Ability	800+	99+
Math Ability	800+	99+
Logical Reasoning	758.07	99+
OVERALL GSA	800+	99+


BUREAU OF EDUCATION
National Career Assessmen
EXAMINEE # 0598225Y3
SURNAME RAGAS
GIVEN NAME JOHN VICTOR
HIGH SCHOOL CENTRAL VISAYAN INSTITUTE FOUNDATION
SCHOOL ID 404250
NCAE Ratings
Descriptive Rating
Excellent (E) PR 99+
Very High (VH) PR 95 - 99
Above Average (AA) PR 86 - 97
Average (A) PR 51 - 85
AREAS
GSA 800+

NCAE 2016

25 CVIF students
(14.5 % of the batch)

qualified for admission to the University of the Philippines for AY 2018-2019

National Licensure Examination for Teachers (LET)

- 4th Place, September 2016 :

  Ma. Herna S. Macas (CVIF Batch 2012)

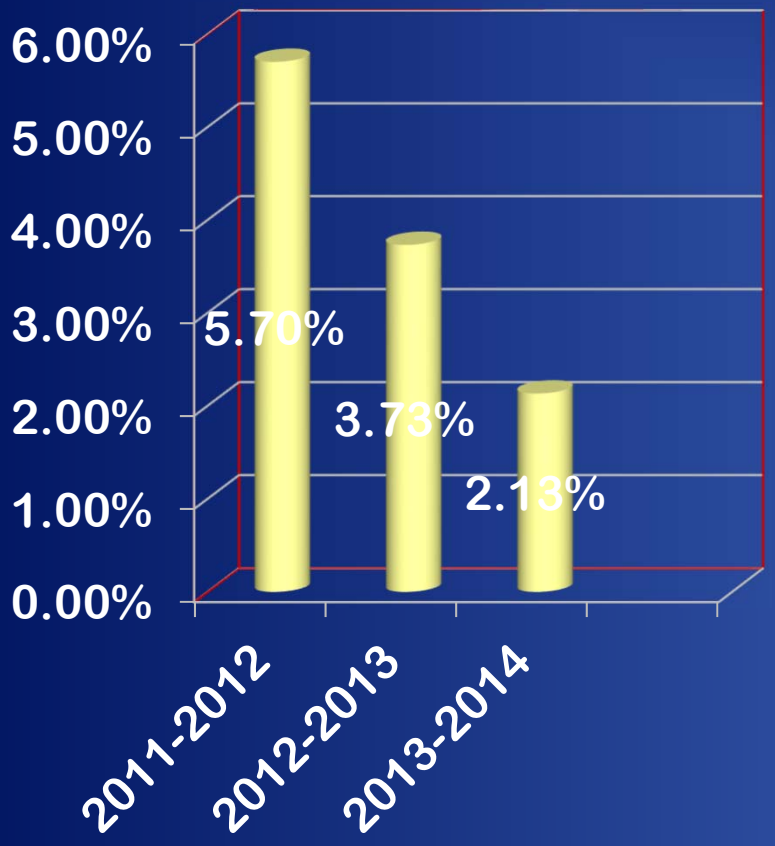
- 7th Place, March 2016 :

  Vincent D. Cuarteros (CVIF Batch 2010)

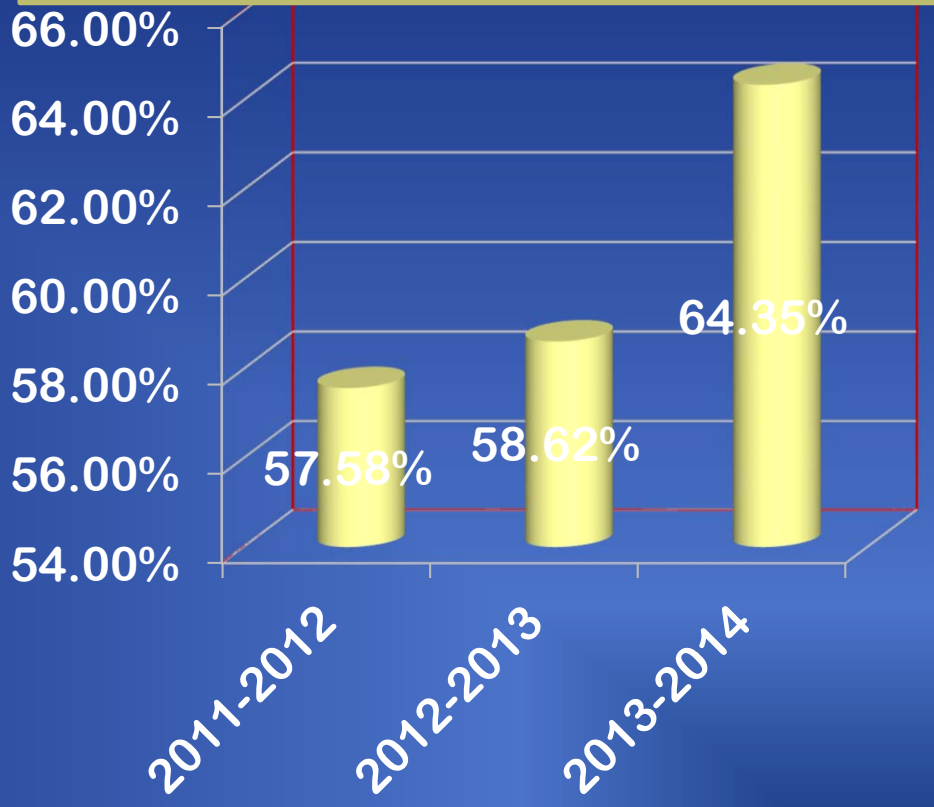
Impact of CVIF-DLP in Bohol, Philippines

Department of Education (Province of Bohol)
(162 Public High Schools)

Failure Rate



National Achievement Test Results



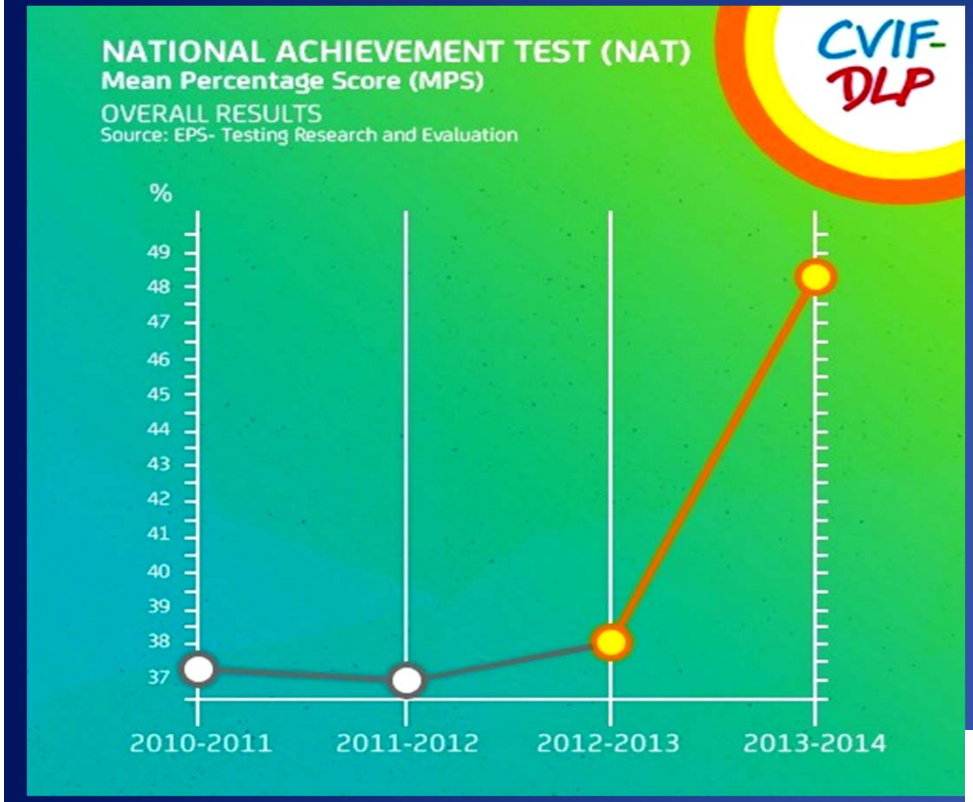
Marites M. Cimeni, PhD dissertation, Univ. of Bohol 2014: Assessment on the DLP in the Department of Education Division of Bohol

- **General remarkable improvement in academic performance in all five subject areas – English, Math, Science, Filipino and Araling Panlipunan – of the National Achievement Test (NAT) of 137 secondary schools**

Impact of CVIF-DLP in Basilan, Philippines

Department of Education (Basilan, Mindanao)

19 Secondary Schools



Partners:

Local Government

SMART

PLDT SMART FOUNDATION

Stella Maris College
and the
DEPARTMENT OF EDUCATION
NATIONAL EDUCATION TESTING AND RESEARCH CENTER
S.Y. 2015-2016

National Career Assessment Exam

No. of students who are good in the following academic strands

a. STEM: 68 out of 187
(36% of the Students got 98-99+)

b. ABM: 72 out of 187
(39% of the Students got 98-99+)

c. HUMSS: 31 out of 187
(17% of the Students got 98-99+)

NCAE Test Scores (GSA)

PR	2009-10	2010-11	2011-12	2012-13	2014-15	2015-16	2016-17
99+	5%	22%	19%	49%	39%	44%	46%
98-99	17%	34%	24%	15%	24%	27%	35%
86-97	59%	33%	42%	29%	27%	17%	16%
51-85	20%	10%	13%	4%	9%	7%	2%
Others			2%	3%	1%	5%	1%

Success Indicators of CVIF-DLP in Davao Christian High School

International Benchmarking

- SAT 2009 math scores of marker student within cut-off of good American universities *(Math 660)*

CVIF Alumna

Jesha Caseñas (CVIF 2005) graduated B.S. Anthropology from University of California (UC), Berkeley

Note: 22 Nobel Prizes have been awarded to UC Berkeley faculty.

CVIF Alumnus

Ronald Lloren (*CVIF 2005)*: doing Ph.D. (Marine Sciences) at ETH Zurich (Swiss Federal Institute) .

ETH Zurich is number One in the world in Earth and Marine Sciences (2018 QS World Ranking of Universities by discipline).

Albert Einstein studied and taught at ETH.

21 Nobel Prizes so far for ETH Zurich.

CVIF Alumnus

Ronald Lloren (*CVIF 2005)* : Ph.D. (Marine Science) candidate at ETH Zurich (Swiss Federal Institute) .

- First year marks on written comprehensive exams: 5/6, 5/6, 6/6
- Accepted to the competitive (30/103) summer institute funded by the US National Science Foundation:

"Your application stood out as excellent because of its thoughtfulness, detail, and specificity…"

CVIF Alumna

Madelynn Nayga (CVIF 2009) in Ph.D. (Physics) joint program at Max Planck Institute (MPI) and University of Dresden, Germany. Max Planck Institute programs are highly competitive.

Ms. Nayga topped the 2017 Condensed Matter Physics post-masteral 10-month Diploma Class at the International Centre for Theoretical Physics, Trieste, Italy.

The choice of a **good educational program** allows large cohorts of students to reach globally competitive levels of achievement.

Workshop on

COMPUTATIONAL METHODS IN BIOLOGY

October 5 - 6, 2018

Central Visayan Institute Foundation

Jagna, Bohol 6308, Philippines

- Basic programming in Python and TensorFlow
- Artificial intelligence in Biology
- Using computers to study evolution
- Big data in Biology

LECTURERS

Dr. Hyunjin Shim (*Biotechnology and Bioengineering, École Polytechnique Fédéral de Lausanne, Switzerland*) Dr. Shim is a computational biologist at the interface of Genetics and Machine Learning and was previously a researcher at the Artificial Intelligence Laboratory of Stanford University, USA.

Dr. Victor Sojo (*Evolutionary Biology and Chemistry, University College London, UK*) Dr. Sojo is a fellow of the Institute for Advanced Studies in Berlin. He did postdoctoral work at Ludwig-Maximilian University, Germany, as Research Fellow of the European Molecular Biology Organization and at RIKEN, Tokyo, under the Japan Society for the Promotion of Science program.