



2017 Asian Regional CDIO Meeting



## SHOWCASE OF AN AUTOMATIC ASSESSMENT SYSTEM FOR STUDENTS' PERFORMANCE AND ACCREDITATION



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Bangkok, Thailand

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# Outlines

- Educational accreditation reform in Vietnam
- Challenges of collecting evident data for Assessment & Evaluation
- CDIO at Duy Tan University
- Automatic assessment system for students' performances
- Conclusions

# The challenges of higher education in Vietnam

- Over 400 universities & colleges
- ASEAN Economic Community formation in 2015
- Competition with the labor from neighboring countries
- Vietnamese government movement: building start-up ecosystem
- But...
  - No university or college which is in the charts of the Top 400 schools (Times Higher Education World University Rankings) or in the charts of Top 600 schools (QS World University Rankings)
  - Degrees and diploma of higher education (HE) has not been recognized in many developed countries

**HOW TO BE RECOGNIZED...???**

# Educational accreditation reform in Vietnam

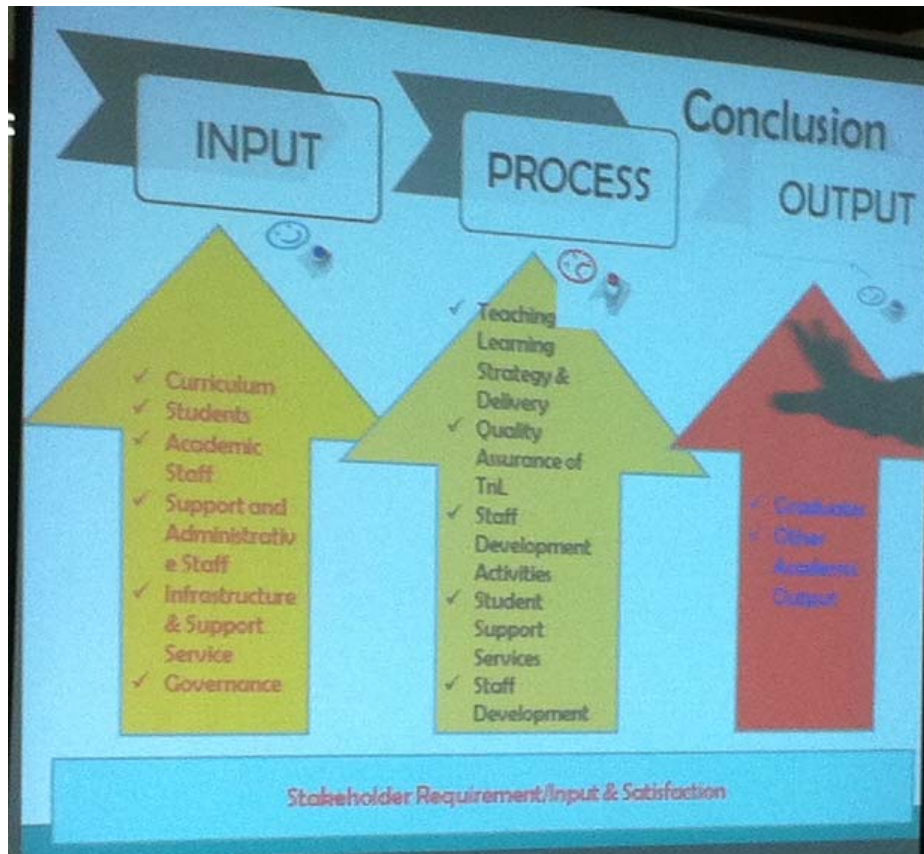
## **Before 2016**

- The Vietnamese HE quality assurance system on a national level is not complete
- Lack of independence between 3 activities: self-assessment, external evaluation, and the national HE quality recognition
- The role of professional associations in accrediting individual training programs is completely absent.
- The transparency of data and information used for the evaluation process is low.
- Human resource in the national quality accreditation is lacking both in quantity, capacity and capability

## **Up till now**

- 4 independent national accreditation agencies establishment
- Over 300 licensed evaluators
- International accreditation encouragement
- AUN-QA (15+ programs), ABET (2 programs), ACBSB (2 programs) HCERES- France (in progress)

# Concerns



## Student Assessment

### AREAS FOR IMPROVEMENT

- There is lack of evidenced of the assessment of the learning outcomes. The assessment plan does don't show the alignment of assessment methods as well as the examination questions to the outcome.
- There also seems to be a lack of awareness amongst lecturers that the achievement of each learning outcome need to be evaluated. This shall facilitate identifying outcomes achieved and not achieved to be the basis for improvement actions as well as students performance in each outcome to be the basis for intervention. This action is pertinent in the PDCA cycle of outcome-based education

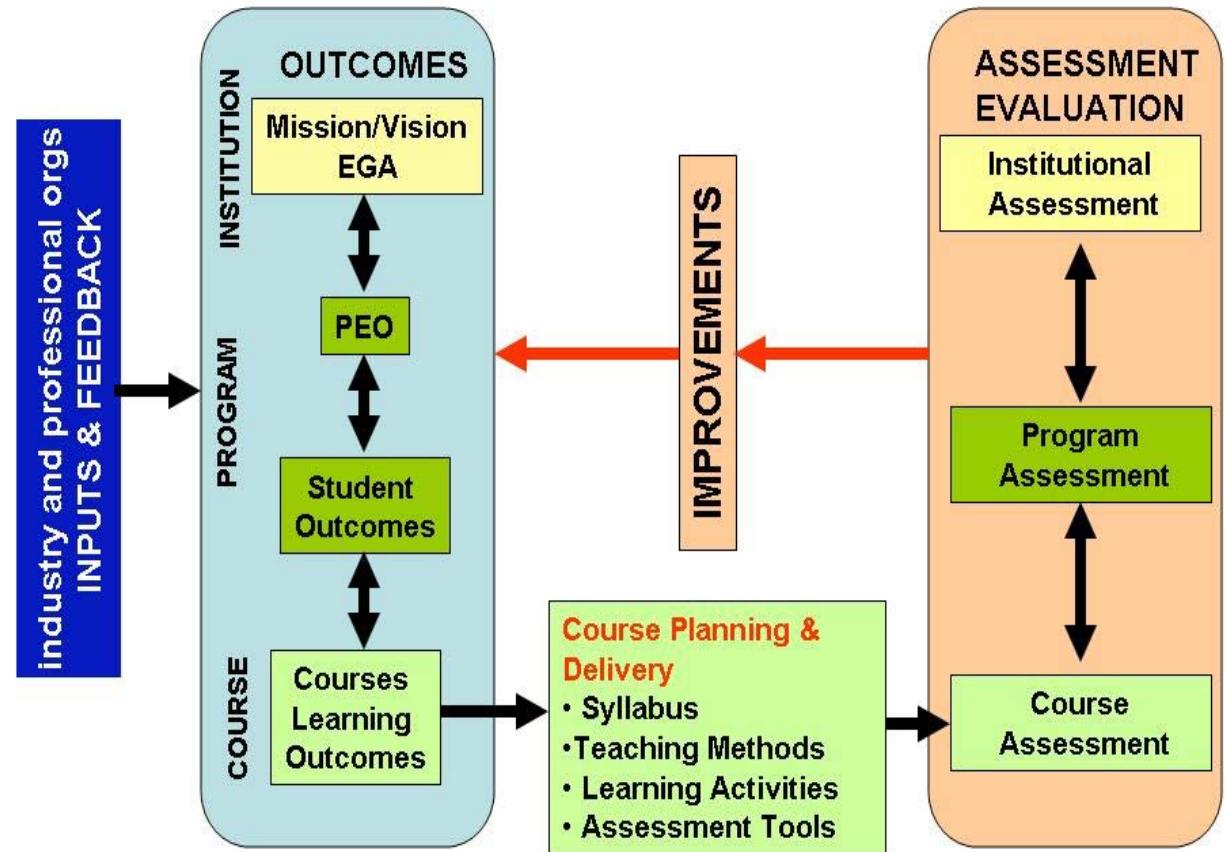
AUN-QA Assessment Report Highlights



The understanding and thus embracement of the concept of ELOs and the philosophy of outcome –based education amongst programme owners and faculty is still in its infancy. This is reflected in the formulation and statement of ELOs at the programme and course levels and more important the seems an obvious lack of understanding on the need for and the method of LO analysis at the end of each course and programme.

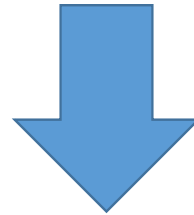
AUN-QA Assessment Report Highlights

## The OBE Framework



# As we know the challenges

- Big size class
- Over faculty workload
- More specific learning outcomes
- A huge data evident
- Assessment & Evaluation are a heavy work



**NEED A EFFECTIVE TOOL**

1	TECHNICAL KNOWLEDGE AND REASONING	3.2	COMMUNICATIONS [g]
1.1	KNOWLEDGE OF UNDERLYING SCIENCES [a]	3.2.1	Communications Strategy
1.2	CORE ENGINEERING FUNDAMENTAL KNOWLEDGE [a]	3.2.2	Communications Structure
1.3	ADVANCED ENGINEERING FUNDAMENTAL KNOWLEDGE [k]	3.2.3	Written Communication
		3.2.4	Electronic/Multimedia Communication
		3.2.5	Graphical Communication
		3.2.6	Oral Presentation and Inter-Personal Communications
2	PERSONAL AND PROFESSIONAL SKILLS AND ATTRIBUTES	3.3	COMMUNICATION IN FOREIGN LANGUAGES
2.1	ENGINEERING REASONING AND PROBLEM SOLVING [e]	3.3.1	English
2.1.1	Problem Identification and Formulation	3.3.2	Languages of Regional Industrial Nations
2.1.2	Modeling	3.3.3	Other languages
2.1.3	Estimation and Qualitative Analysis		
2.1.4	Analysis With Uncertainty	4	CONCEIVING, DESIGNING, IMPLEMENTING, AND OPERATING SYSTEMS IN THE ENTERPRISE AND SOCIETAL CONTEXT
2.1.5	Solution and Recommendation	4.1	EXTERNAL AND SOCIETAL CONTEXT [h]
2.2	EXPERIMENTATION AND KNOWLEDGE DISCOVERY [b]	4.1.1	Roles and Responsibility of Engineers
2.2.1	Hypothesis Formulation	4.1.2	The Impact of Engineering on Society
2.2.2	Survey of Print and Electronic Literature	4.1.3	Society's Regulation of Engineering
2.2.3	Experimental Inquiry	4.1.4	The Historical and Cultural Context
2.2.4	Hypothesis Test, and Defense	4.1.5	Contemporary Issues and Values [i]
2.2.5	Developing a Global Perspective	4.1.6	Developing a Global Perspective
2.3	SYSTEM THINKING	4.2	ENTERPRISE AND BUSINESS CONTEXT
2.3.1	Thinking Holistically	4.2.1	Appreciating Different Enterprise Cultures
2.3.2	Emergence and Interactions in Systems	4.2.2	Enterprise Strategy, Goals, and Planning
2.3.3	Prioritization and Focus	4.2.3	Technical Entrepreneurship
2.3.4	Trade-offs, Judgment and Balance in Resolution	4.2.4	Working Successfully in Organizations
2.4	PERSONAL SKILLS AND ATTRIBUTES	4.3	CONCEIVING AND ENGINEERING SYSTEMS [c]
2.4.1	Initiative and Willingness to Take Risks	4.3.1	Setting System Goals and Requirements
2.4.2	Perseverance and Flexibility	4.3.2	Defining Function, Concept and Architecture
2.4.3	Creative Thinking	4.3.3	Modeling of System and Insuring Goals Can Be Met
2.4.4	Critical Thinking	4.3.4	Development Project Management
2.4.5	Awareness of One's Personal Knowledge, Skills, and Attitudes	4.4	DESIGNING [c]
2.4.6	Curiosity and Lifelong Learning [j]	4.4.1	The Design Process
2.4.7	Time and Resource Management	4.4.2	The Design Process Phasing and Approaches
2.5	PROFESSIONAL SKILLS AND ATTITUDES	4.4.3	Utilization of Knowledge in Design
2.5.1	Professional Ethics, Integrity, Responsibility, and Accountability [f]	4.4.4	Disciplinary Design
2.5.2	Professional Behavior	4.4.5	Multidisciplinary Design
2.5.3	Proactively Planning for One's Career	4.4.6	Multi-Objective Design (DFX)
2.5.4	Staying Current on World of Engineering	4.5	IMPLEMENTING [c]
3	INTERPERSONAL SKILLS: TEAMWORK AND COMMUNICATION	4.5.1	Designing the Implementation Process
3.1	TEAMWORK [d]	4.5.2	Hardware Manufacturing Process
3.1.1	Forming Effective Teams	4.5.3	Software Implementing Process
3.1.2	Team Operation	4.5.4	Hardware Software Integration
3.1.3	Team Growth and Evolution	4.5.5	Test, Verification, Validation, and Certification
3.1.4	Leadership	4.5.6	Implementation Management
3.1.5	Technical Teaming	4.6	OPERATING [c]
		4.6.1	Designing and Optimizing Operations
		4.6.2	Training and Operations
		4.6.3	Supporting the System Lifecycle
		4.6.4	System Improvement and Evolution
		4.6.5	Disposal and Life-End Issues
		4.6.6	Operations Management

How many specific students do we have in CDIO Syllabus 4-th level?

# CDIO at Duy Tan University

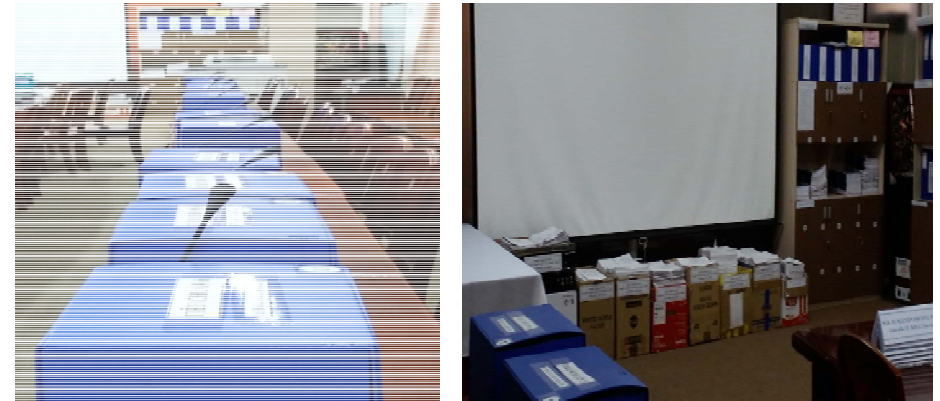
## 1-st stage

- Curriculum re-design
- New syllabi design
- Lab-Facilities reconstruction
- CDIO working space



## 2-nd stage

- Students' performance assessment & evaluation
- International Accreditations





# Our Approach

Compile baseline data to demonstrate the relationship between Student Outcomes and the curriculum

STUDENT OUTCOMES (SOs)	LEVEL CORRELATION OF COURSES TO SOs				
	VS (40%) COURSE #	S (30%) COURSE #	M (15%) COURSE # COURSE #	L (10%) COURSE #	VL (5%)
a					
b					
c					
d					
e					
f					
g					
h					
i					
j					
k					
...					

VS: very strong; S: strong; M: medium; L: low; VL: very low

# Sample of Course Assessment Description

DUY TAN UNIVERSITY		COURSE GENERAL INFORMATION		
<b>Name of course</b>		SE 1		
<b>Instructor's name</b>		Nguyen Van A		
<b>Department</b>		International School		
<b>Class</b>		K18CMU		
<b>Type of assessment</b>		Number of Questions	Percentage Distribution, %	
<b>1</b>	Attendance		10	
<b>2</b>	Quiz	3	10	
<b>3</b>	Assignment			
<b>4</b>	Homework	4	10	
<b>5</b>	Midterm Exam	2	20	
<b>6</b>	Final Exam	3	50	
<b>7</b>	Other			
	<b>Total:</b>		100	
<b>Course Learning Outcome (CLO)</b>		Relating to Student Outcomes (SO)	Level coverage	Type of Assessment
<b>CLO 1:</b>		(b)	S	Quiz, Midterm Exam, Homework, Final Exam
<b>CLO 2:</b>		(a), (d)	M	Quiz, Midterm Exam, Homework, Final Exam
<b>CLO 3:</b>		(e)	L	Quiz, Homework

# Break down grading along course outcomes on the assignments/exams

Type of assessment	Question	Student ID						Maximum points	Percentage Distribution	Class average	Relate to CLO	Relate to SO
		100	101	102	103	104	105					
Quiz	Q1	25	30	18	10	14	23	30	10	20.0	2	a
	Q2	35	35	30	30	35	30	40		32.5	1	b
	Q3	23	25	15	20	30	20	30		22.2	3	e
Midterm Exam	Q1	30	40	35	15	25	36	40	20	30.2	2	a
	Q2	50	50	60	60	40	50	60		51.7	1	b
Homework	Q1	15	20	12	10	14	6	20	10	12.8	2	a
	Q2	15	15	20	20	14	7	20		15.2	1	b
	Q3	25	30	25	16	25	14	30		22.5	2	a
	Q4	25	30	26	14	16	8	30		19.8	3	e
Final exam	Q1	25	20	30	20	25	20	30	50	23.3	2	a
	Q2	15	20	18	10	20	15	20		16.3	2	d
	Q3	50	45	50	45	40	40	50		45.0	1	b

## Average course learning outcome achievement

Course Outcomes	Student ID						CLO Average achievement
	100	101	102	103	104	105	
CLO 1	5	4	5	5	4	4	4.5
CLO 2	4	4	4	3	4	4	3.8
CLO 3	4	5	3	3	4	2	3.5

## Course learning outcome assessment data

Course Outcomes	Outcome average achievement	Outcome achievement distribution in course				
		5	4	3	2	1
CLO 1	4.5	50.0%	50.0%	0.0%	0.0%	0.0%
CLO 2	3.8	0.0%	83.3%	16.7%	0.0%	0.0%
CLO 3	3.5	16.7%	33.3%	33.3%	16.7%	0.0%



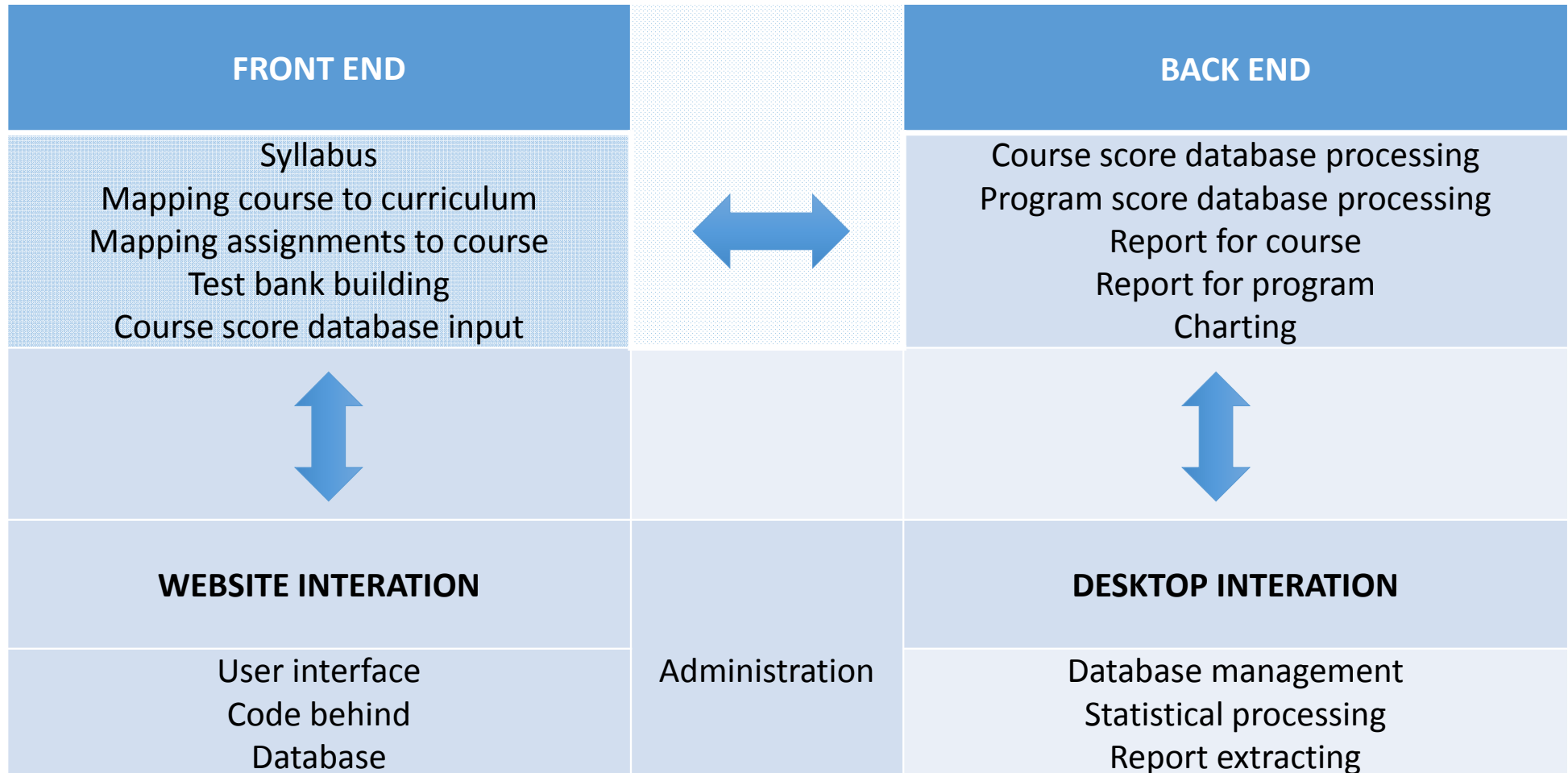
## Average program learning outcome achievement in course

SO	Student ID						SO in course Average achievement
	100	101	102	103	104	105	
a	4	4	4	3	4	3	3.7
b	5	4	5	5	4	4	4.5
c							
d	4	5	5	3	5	4	4.3
e	4	5	3	3	4	2	3.5
f							
g							
h							
i							
j							
k							
...							

## Program learning outcome assessment data in course

SO	Outcome in course average achievement	Outcome achievement distribution in course				
		5	4	3	2	1
a	3.7	0.0%	66.7%	33.3%	0.0%	0.0%
b	4.5	50.0%	50.0%	0.0%	0.0%	0.0%
c						
d	4.3	50.0%	33.3%	16.7%	0.0%	0.0%
e	3.5	16.7%	33.3%	33.3%	16.7%	0.0%
f						
g						
h						
i						
j						
k						
...						

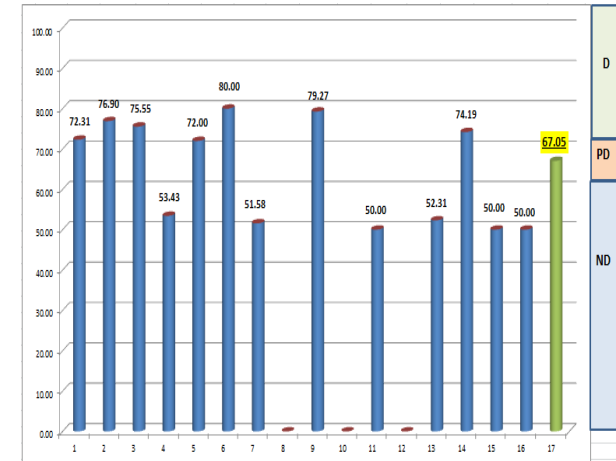
# Automatic assessment system overview



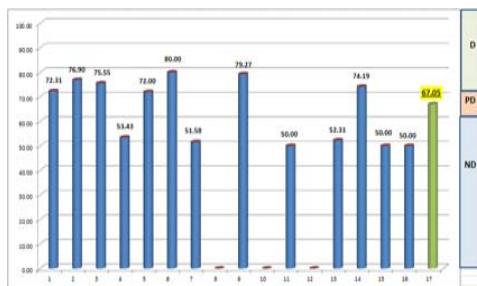
# LOs Achievement Level and Graphical Presentation for each Faculty and Course



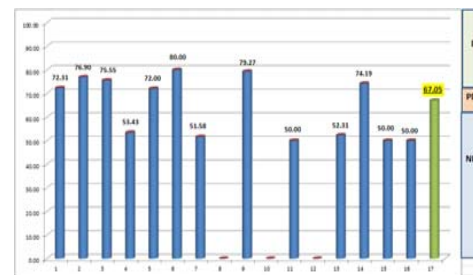
Dr. \*\*\*



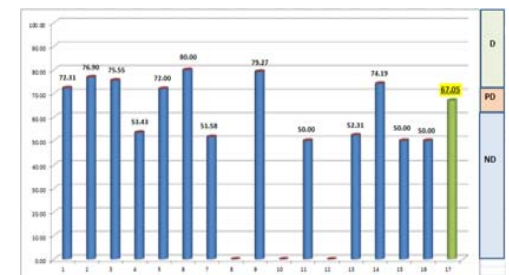
Course #1 Report



Course #2 Report



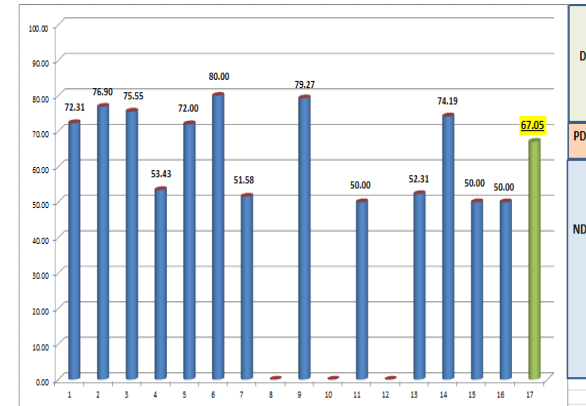
Course #3 Report



# LOs Achievement Level and Graphical Presentation for each Program



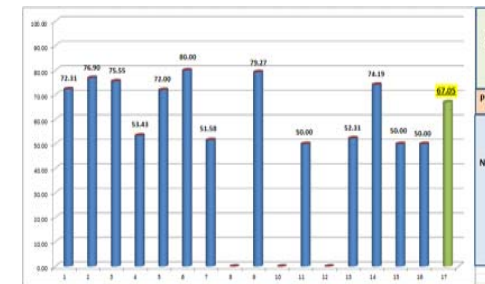
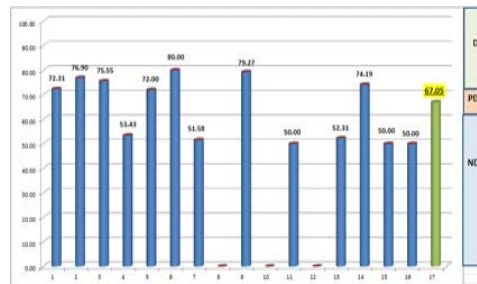
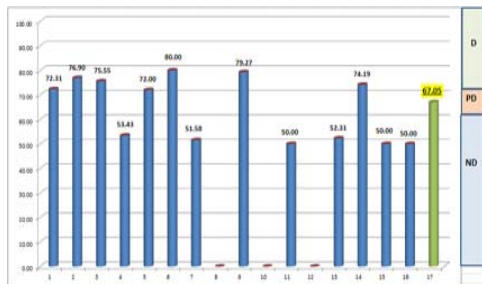
LOs : Program Level



Dr. A

Dr. B

Dr. C





# DEMO

Input Textbook & Test-bank



Mapping CLOs & SOs to Courses



Creating Assignments



Mapping CLOs & SOs to every questions, rubric in any type off assessment



Output Report for Class, Course, and Program

Input  
Textbook &  
Test-bank

NGUYỄN, TRANG BẢO

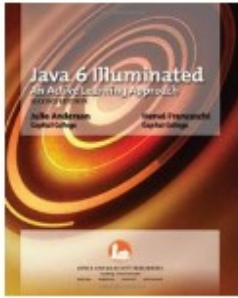
TextBook or Teachers Guide

Input Test Question

Input Test Question

53

### General information

	<b>Title:</b> Java 6 Illuminated: An Active Learning Approach	<b>Edition:</b> 2	<b>Language:</b> Tiếng Anh
	<b>Textbook type:</b> TextBook		<b>Number of pages:</b> Unidentified
	<b>Year of publication:</b> 2007	<b>Issue No:</b>	<b>ISSN:</b>
	<b>Volume No:</b>	<b>ISBN-10:</b>	
	<b>Author:</b> Anderson Julie, Franceschi Herve	<b>ISBN-13:</b>	
	<b>Publication:</b> Jones & Bartlett Publishers		

### FORM INPUT QUESTION

#### Basic information

Type of Question (\*):

:

Question content (\*):

#### Questioning setting

SOLUTION

#### Cited at

Heading

Page number:

Line number:

# Mapping CLOs & SOs to Courses

- Personal Info
- News & Announcements
- Calendar
- Academic Affairs
- Resource Management
- Academic Accreditation
- Student Mentoring
- Student Feedback
- Library
- Student Handbook
- Regulations for myDuyTan Usage
- Survey

Assign CLO & SO

CLASS NAME: CMU-CS 303 BIS FUNDAMENTALS OF COMPUTING 1

Academic Program: K-21 - Công Nghệ Phần Mềm Chuẩn CMU (Đại Học)  
 Academic Accreditation: ABET-EAC | ABET-EAC (Engineering Accreditation Commission)

Select Course Learning Outcome (CLO): --Tất cả--

Select Student outcome (SO): +

CLO	Heading	Teaching type	Accreditation type	Correlation level	Student Outcome	
CLO-CMU-CS303BIS-20152016II-01	CONT.1 Giới thiệu Java CONT.2 Kiểu Dữ liệu, Biến, Toán tử, Biểu thức CONT.3 Đầu vào và Đầu ra qua Màn hình <span style="color: green; font-weight: bold;">+</span>	<ul style="list-style-type: none"> <li>▪ Giảng Lý Thuyết</li> </ul> <span style="color: green; font-weight: bold;">+</span>	<ul style="list-style-type: none"> <li>▪ Kiểm Tra Thường Kỳ</li> <li>▪ Bài Tập Về Nhà</li> </ul> <span style="color: green; font-weight: bold;">+</span>	M	SO-102CMU-K21-ABET-EAC-3a	✗
CLO-CMU-CS303BIS-20152016II-02	CONT.3 Đầu vào và Đầu ra qua Màn hình CONT.2 Kiểu Dữ liệu, Biến, Toán tử, Biểu thức <span style="color: green; font-weight: bold;">+</span>	<ul style="list-style-type: none"> <li>▪ Giảng Lý Thuyết</li> <li>▪ Thực Hành Lab</li> </ul> <span style="color: green; font-weight: bold;">+</span>	<ul style="list-style-type: none"> <li>▪ Bài Tập Về Nhà</li> <li>▪ Kiểm Tra Giữa Kỳ</li> <li>▪ Kiểm Tra Thường Kỳ</li> </ul> <span style="color: green; font-weight: bold;">+</span>	H	SO-102CMU-K21-ABET-EAC-3b	✗
CLO-CMU-CS303BIS-20152016II-03	CONT.3 Đầu vào và Đầu ra qua Màn hình <span style="color: green; font-weight: bold;">+</span>	<ul style="list-style-type: none"> <li>▪ Thực Hành Lab</li> <li>▪ Giảng Lý Thuyết</li> </ul> <span style="color: green; font-weight: bold;">+</span>	<ul style="list-style-type: none"> <li>▪ Bài Tập Về Nhà</li> </ul> <span style="color: green; font-weight: bold;">+</span>	M	SO-102CMU-K21-ABET-EAC-3d	✗

Mapping CLOs & SOs to every Assignments rubric in any type of assessment

- News & Announcements
- Calendar
- Academic Affairs
- Resource Management
- Textbook Management
- Test Bank
- Academic Accreditation
- Student Mentoring
- Student Feedback
- Library
- Student Handbook
- Regulations for myDuyTan Usage
- Survey

Assign CLO & SO

CLASS NAME: CMU-CS 303 BIS FUNDAMENTALS OF COMPUTING 1

	Exercise name	Grade percentile	Max grade	Posted date	Due date	
1	Test Quizzes	10.00%	10	09/04/2016	17/05/2016	

**LIST OF QUESTIONS HAS CREATED THE TEST: TEST QUIZZES**

This course is belong to **1** Academic program and **1** Academic Accreditation .

K-21 - Công Nghệ Phần Mềm Chuẩn CMU (Đại Học) | ABET-EAC | ABET-EAC (Engineering Accreditation Commission)  The all question is enough assign CLO and SO

Select Academic Program: K-21 - Công Nghệ Phần Mềm Chuẩn CMU (Đại Học) ▼

Select Academic Accreditation: ABET-EAC | ABET-EAC (Engineering Accreditation Commission) ▼

This exam is enough CLO and SO

	Question content	Grade	% Grade	Question type	
5	Ai là người đã viết ra MS DOS?	2.00	2.00%	Câu Hỏi Trả Lời Ngắn	

Gắn Mục tiêu Môn học (CLO) và Chuẩn đầu ra (SO) cho Câu hỏi: [\[Đóng\]](#)

Câu hỏi	Đáp án / Gợi ý	Điểm, % Điểm	
Ai là người đã viết ra MS DOS?	Tim Patterson	2.00 2.00%	Cập nhật

**Chọn Mục tiêu Môn học (CLO):**  
 CLO-CMU-CS303BIS-20152016II-01 | CLO.1 Hiểu và có khả năng sử dụng cái loại dữ liệu cơ bản, các câu trúc đi ▼

**Chọn Chuẩn đầu ra Chương trình (SO):**

SO-102CMU-K21-ABET-EAC-3a | (a) khả năng áp dụng kiến thức toán học, khoa học và kỹ thuật tương ứng với ngành Công nghệ Phần mềm,

8	Hãy chỉ ra một hệ điều hành cho thiết bị di động:	4.00	4.00%	Câu Hỏi Nhiều Tùy Chọn	
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Output Report  
for Class,  
Course, and  
Program

**FIGURE 4.1: SUMMARY POINTS (included percentage distribution) FOR EACH STUDENT OUTCOMES**

SO	Trần, Bảo Hoài	Huỳnh, Bình Quốc	Nguyễn, Bình Bắc	Nguyễn, Chung Hoàng	Nguyễn, Cường Mạnh	Lại, Đạt Tấn	Lê, Đạt Thành	Bùi, Định Quốc	Trương, Dũng Quang	Dương Duy Nt	MAX POINTS
SO-102CMU-K21-ABET-EAC-3a	10.00	20.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00
SO-102CMU-K21-ABET-EAC-3b	50.00	40.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	80.00
SO-102CMU-K21-ABET-EAC-3d	40.00	80.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00

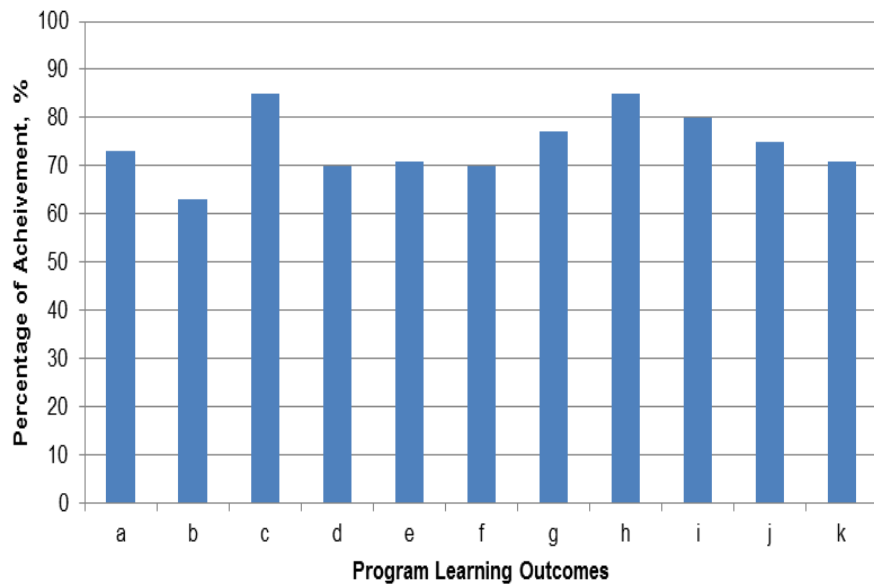
**FIGURE 4.2: AVERAGE STUDENT OUTCOME ACHIEVEMENT**

SO	Trần, Bảo Hoài	Huỳnh, Bình Quốc	Nguyễn, Bình Bắc	Nguyễn, Chung Hoàng	Nguyễn, Cường Mạnh	Lại, Đạt Tấn	Lê, Đạt Thành	Bùi, Định Quốc	Trương, Dũng Quang	Dương Duy Nt	SO AVERAGE
SO-102CMU-K21-ABET-EAC-3a	2	5	5	0	0	0	0	0	0	0	0.3
SO-102CMU-K21-ABET-EAC-3b	3	2	2	0	0	0	0	0	0	0	0.18
SO-102CMU-K21-ABET-EAC-3d	2	4	5	0	0	0	0	0	0	0	0.28

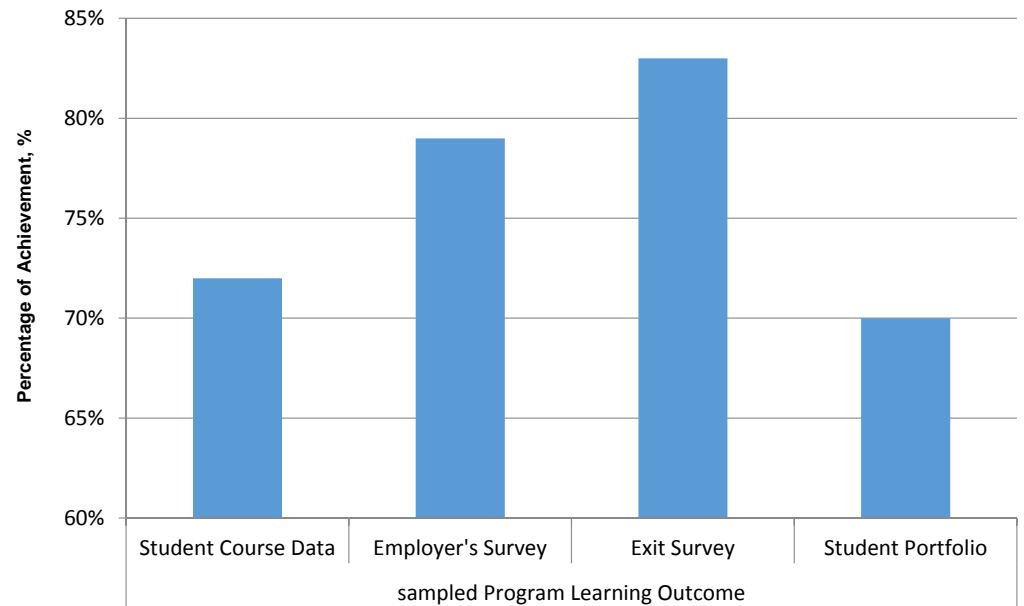
**FIGURE 4.3: STUDENT OUTCOME ASSESSMENT DATA**

SO	Overcome average achievement	5	4	3	2	1
SO-102CMU-K21-ABET-EAC-3a	0.3	5.00%	0%	0%	2.50%	0%
SO-102CMU-K21-ABET-EAC-3b	0.18	0%	0%	2.50%	5.00%	0%
SO-102CMU-K21-ABET-EAC-3d	0.28	2.50%	2.50%	0%	2.50%	0%

# The extent to which student are being met PLOs



Average Achievement of PLO based on Direct and Indirect Assessment Methods



Achievement of a sample PLO based on Direct and Indirect Assessment Methods

# Conclusions

- Assessment and evaluation learners based on OBE are always a time-consuming job.
- This approach help to assess CLO, SO automatically and helps to improve the reliability of the assessment of the achieved level of each CLO or SO by each student thanks to taking into account the contribution of each assessment tool as well as their weighting for the same outcome.
- This approach has brought about a great leap in the amount of time and effort required for the assessment of students' performance as well as for the accreditation documentation effort at DTU.
- It also significantly helps enhance effectiveness in the decision-making process for various academic affairs and issues.

*Thank you for your attention*



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## 2018 CDIO ASIAN REGIONAL MEETING

12<sup>th</sup> - 14<sup>th</sup>, March, 2018

Organized by Duy Tan University, 3 Quang Trung, Da Nang, Viet Nam

Time Left To Conference:

367  
Days

3  
Hours

15  
Minutes

49  
Seconds