2017 Asian Regional CDIO Meeting

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

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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

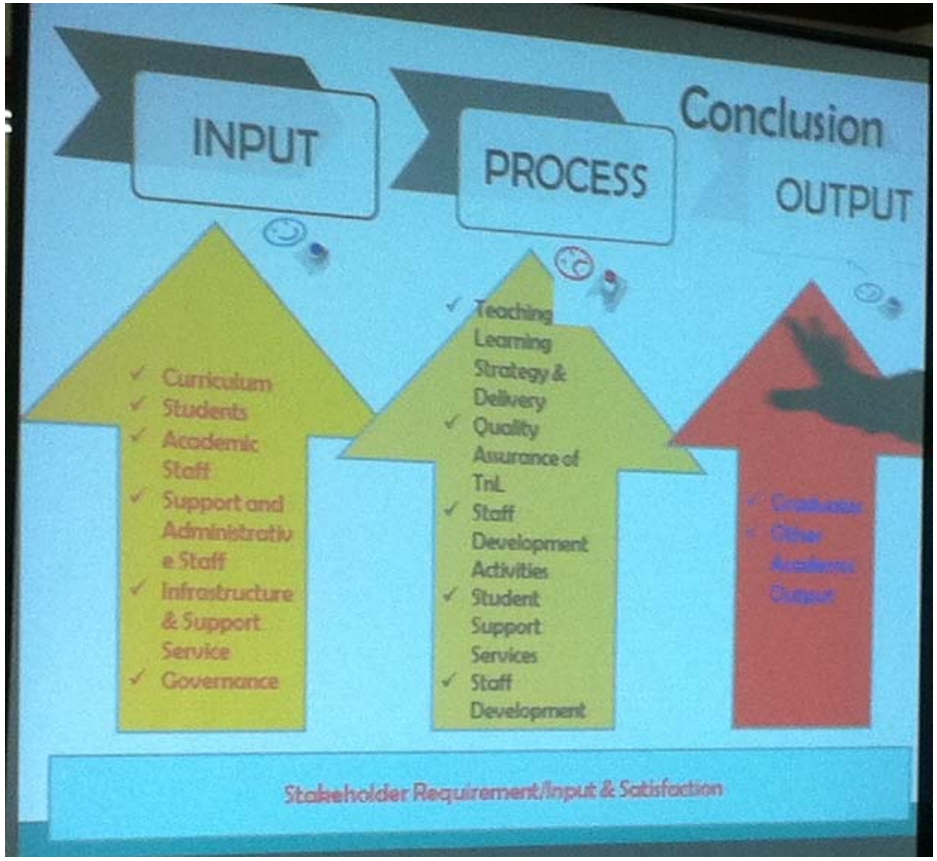
- Over 400 universities & colleges
- ASEAN Economic Community formation in 2015
- Competition with the labor from neighboring countries
- Vietnamese government movement: building start-up ecosystem
- But…
  - No university or college which is in the charts of the Top 400 schools (Times Higher Education 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

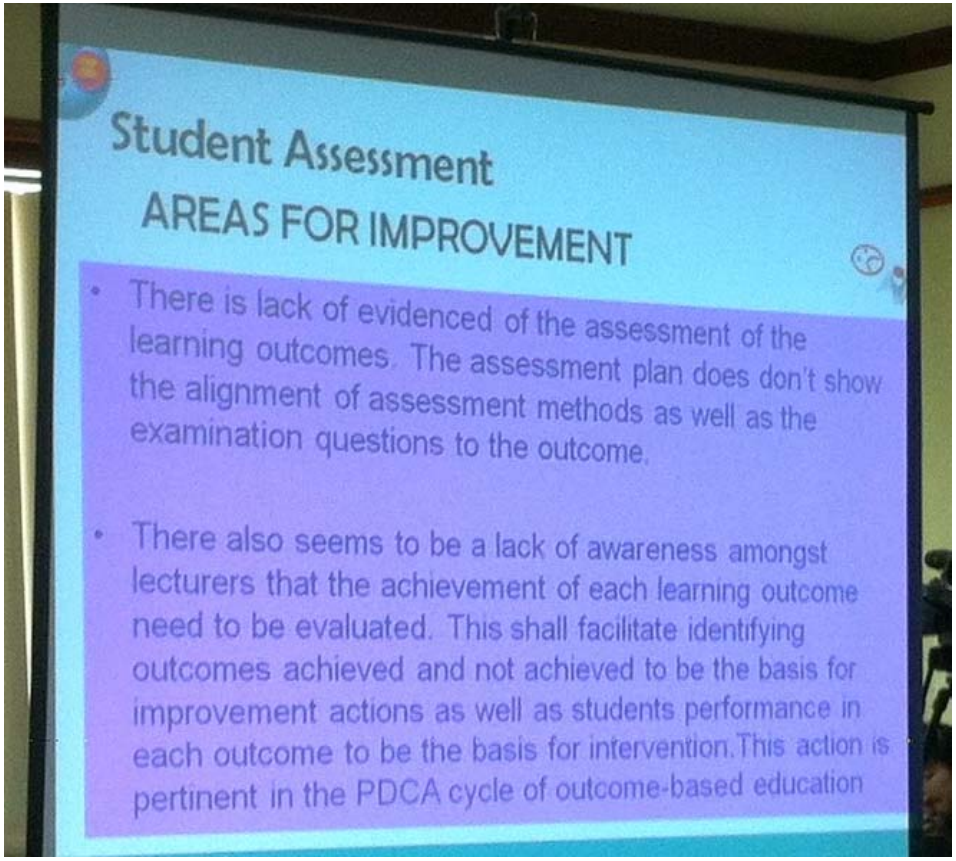
HOW TO BE RECORGNIZED…???

Educational accreditation reform in Vietnam

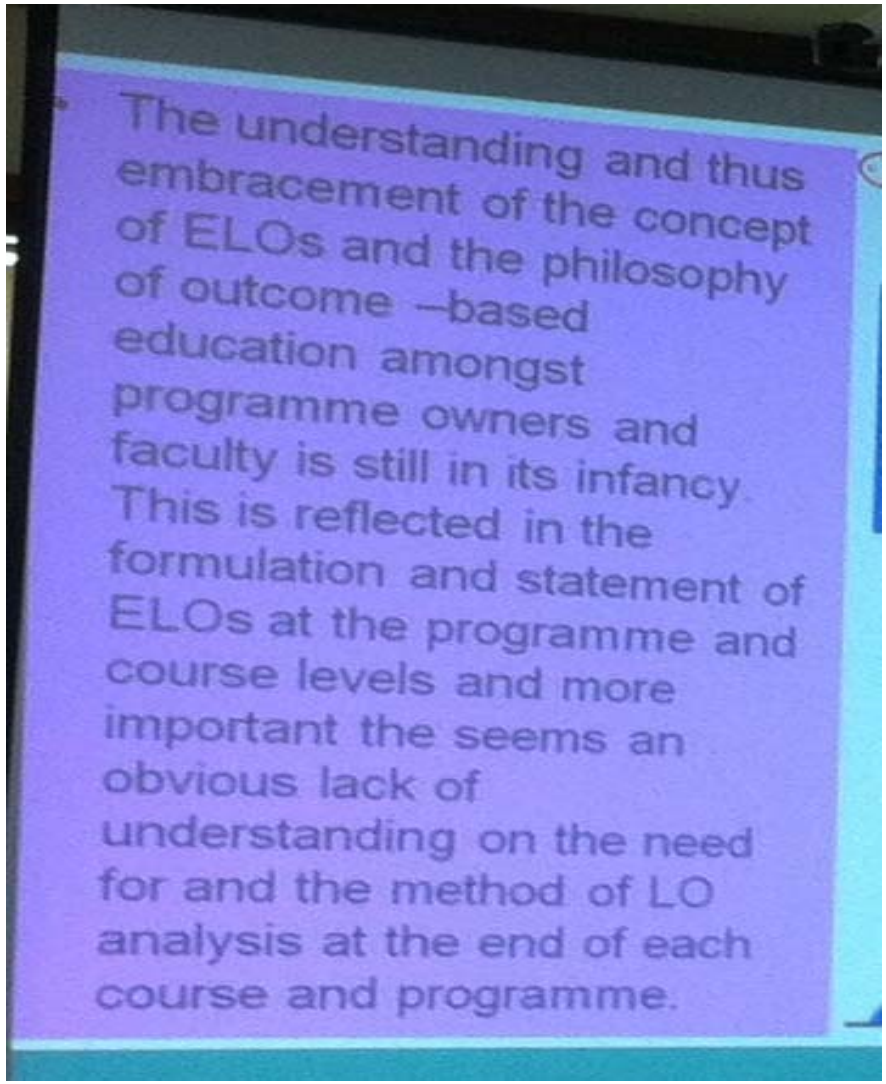
Before 2016	Up till now
• The Vietnamese HE quality assurance system on a national level is not complete • Lack of independence between 3 activities: self-assessment, external evaluation, and the national HE quality recognition • The role of professional associations in accrediting individual training 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	• 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

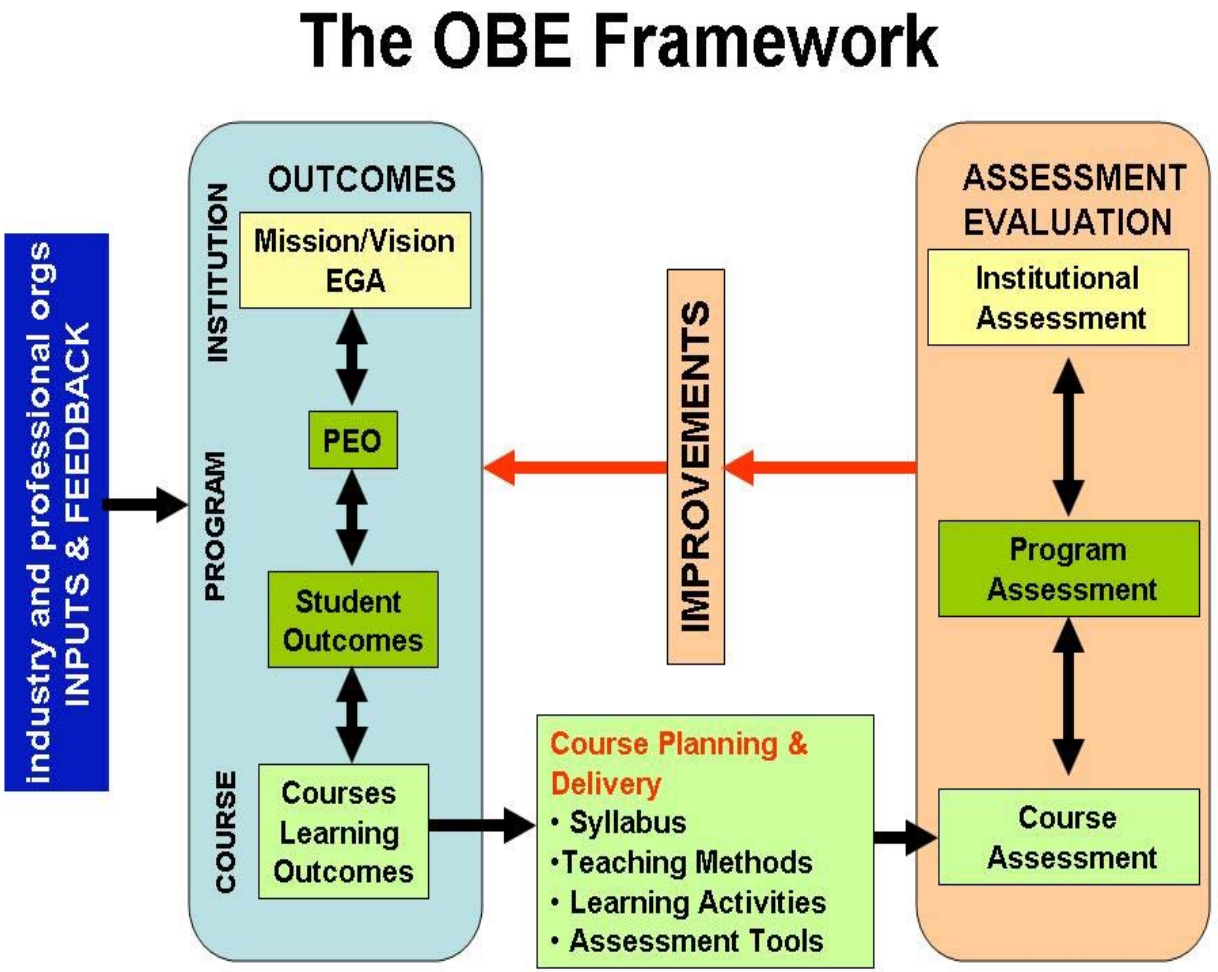




AUN-QA Assessment Report Highlights



AUN-QA Assessment Report Highlights



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
- 1.1 KNOWLEDGE OF UNDERLYING SCIENCES [a]
- 1.2 CORE ENGINEERING FUNDAMENTAL KNOWLEDGE [a]
- 1.3 ADVANCED ENGINEERING FUNDAMENTAL KNOWLEDGE [k]

2 PERSONAL AND PROFESSIONAL SKILLS AND ATTRIBUTES
- 2.1 ENGINEERING REASONING AND PROBLEM SOLVING [e]
  - 2.1.1 Problem Identification and Formulation
  - 2.1.2Modeling
  - 2.1.3Estimation and Qualitative Analysis
  - 2.1.4Analysis With Uncertainty
  - 2.1.5Solution and Recommendation
- 2.2 EXPERIMENTATION AND KNOWLEDGE DISCOVERY [b]
  - 2.2.1Hypothesis Formulation
  - 2.2.2Survey of Print and Electronic Literature
  - 2.2.3Experimental Inquiry
  - 2.2.4Hypothesis Test, and Defense
- 2.3 SYSTEM THINKING
  - 2.3.1Thinking Holistically
  - 2.3.2Emergence and Interactions in Systems
  - 2.3.3Prioritization and Focus
  - 2.3.4Trade-offs, Judgment and Balance in Resolution
- 2.4 PERSONAL SKILLS AND ATTRIBUTES
  - 2.4.1Initiative and Willingness to Take Risks
  - 2.4.2Perseverance and Flexibility
  - 2.4.3Creative Thinking
  - 2.4.4Critical Thinking
  - 2.4.5Awareness of One's Personal Knowledge, Skills, and Attitudes
  - 2.4.6Curiosity and Lifelong Learning [i]
  - 2.4.7Time and Resource Management
- 2.5 PROFESSIONAL SKILLS AND ATTITUDES
  - 2.5.1Professional Ethics, Integrity, Responsibility, and Accountability [f]
  - 2.5.2Professional Behavior
  - 2.5.3Proactively Planning for One's Career
  - 2.5.4Staying Current on World of Engineering

3 INTERPERSONAL SKILLS: TEAMWORK AND COMMUNICATION
- 3.1 TEAMWORK [d]
  - 3.1.1Forming Effective Teams
  - 3.1.2Team Operation
  - 3.1.3Team Growth and Evolution
  - 3.1.4Leadership
  - 3.1.5Technical Teaming
- 3.2 COMMUNICATIONS [g]
  - 3.2.1 Communications Strategy
  - 3.2.2 Communications Structure
  - 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
- 3.3 COMMUNICATION IN FOREIGN LANGUAGES
  - 3.3.1 English
  - 3.3.2 Languages of Regional Industrial Nations
  - 3.3.3 Other languages

4 CONCEIVING, DESIGNING, IMPLEMENTING, AND OPERATING SYSTEMS IN THE ENTERPRISE AND SOCIETAL CONTEXT
- 4.1 EXTERNAL AND SOCIETAL CONTEXT [h]
  - 4.1.1Roles and Responsibility of Engineers
  - 4.1.2The Impact of Engineering on Society
  - 4.1.3Society's Regulation of Engineering
  - 4.1.4The Historical and Cultural Context
  - 4.1.5Contemporary Issues and Values [j]
  - 4.1.6Developing a Global Perspective
- 4.2 ENTERPRISE AND BUSINESS CONTEXT
  - 4.2.1Appreciating Different Enterprise Cultures
  - 4.2.2Enterprise Strategy, Goals, and Planning
  - 4.2.3Technical Entrepreneurship
  - 4.2.4Working Successfully in Organizations
- 4.3 CONCEIVING AND ENGINEERING SYSTEMS [c]
  - 4.3.1Setting System Goals and Requirements
  - 4.3.2Defining Function, Concept and Architecture
  - 4.3.3Modeling of System and Insuring Goals Can Be Met
  - 4.3.4Development Project Management
- 4.4 DESIGNING [c]
  - 4.4.1The Design Process
  - 4.4.2The Design Process Phasing and Approaches
  - 4.4.3Utilization of Knowledge in Design
  - 4.4.4Disciplinary Design
  - 4.4.5Multidisciplinary Design
  - 4.4.6Multi-Objective Design (DFX)
- 4.5 IMPLEMENTING [c]
  - 4.5.1Designing the Implementation Process
  - 4.5.2Hardware Manufacturing Process
  - 4.5.3Software Implementing Process
  - 4.5.4Hardware Software Integration
  - 4.5.5Test, Verification, Validation, and Certification
  - 4.5.6Implementation Management
- 4.6 OPERATING [c]
  - 4.6.1Designing and Optimizing Operations
  - 4.6.2Training and Operations
  - 4.6.3Supporting the System Lifecycle
  - 4.6.4System Improvement and Evolution
  - 4.6.5Disposal and Life-End Issues
  - 4.6.6Operations Management

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

CDIO at Duy Tan University

1-st stage	2-nd stage
• Curriculum re-design • New syllabi design • Lab-Facilities reconstruction • CDIO working space	• 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%)	S (30%)	M (15%)	L (10%)	VL (5%)
a	COURSE #	COURSE #			
b					
c					
d			COURSE # COURSE #		
e					
f					
g					
h		COURSE #			
i					
j				COURSE #	
k					
…					

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

Sample of Course Assessment Description

DUY TAN UNIVERSITY		COURSE GENERAL INFORMATION	
Name of course		SE 1	
Instructor's name		Nguyen Van A	
Department		International School	
Class		K18CMU	
Type of assessment		Number of Questions	Percentage Distribution, %
1	Attendance		10
2	Quiz	3	10
3	Assignment		
4	Homework	4	10
5	Midterm Exam	2	20
6	Final Exam	3	50
7	Other		
	Total:		100

Course Learning Outcome (CLO)	Relating to Student Outcomes (SO)	Level coverage	Type of Assessment
CLO 1:	(b)	S	Quiz, Midterm Exam, Homework, Final Exam
CLO 2:	(a), (d)	M	Quiz, Midterm Exam, Homework, Final Exam
CLO 3:	(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%

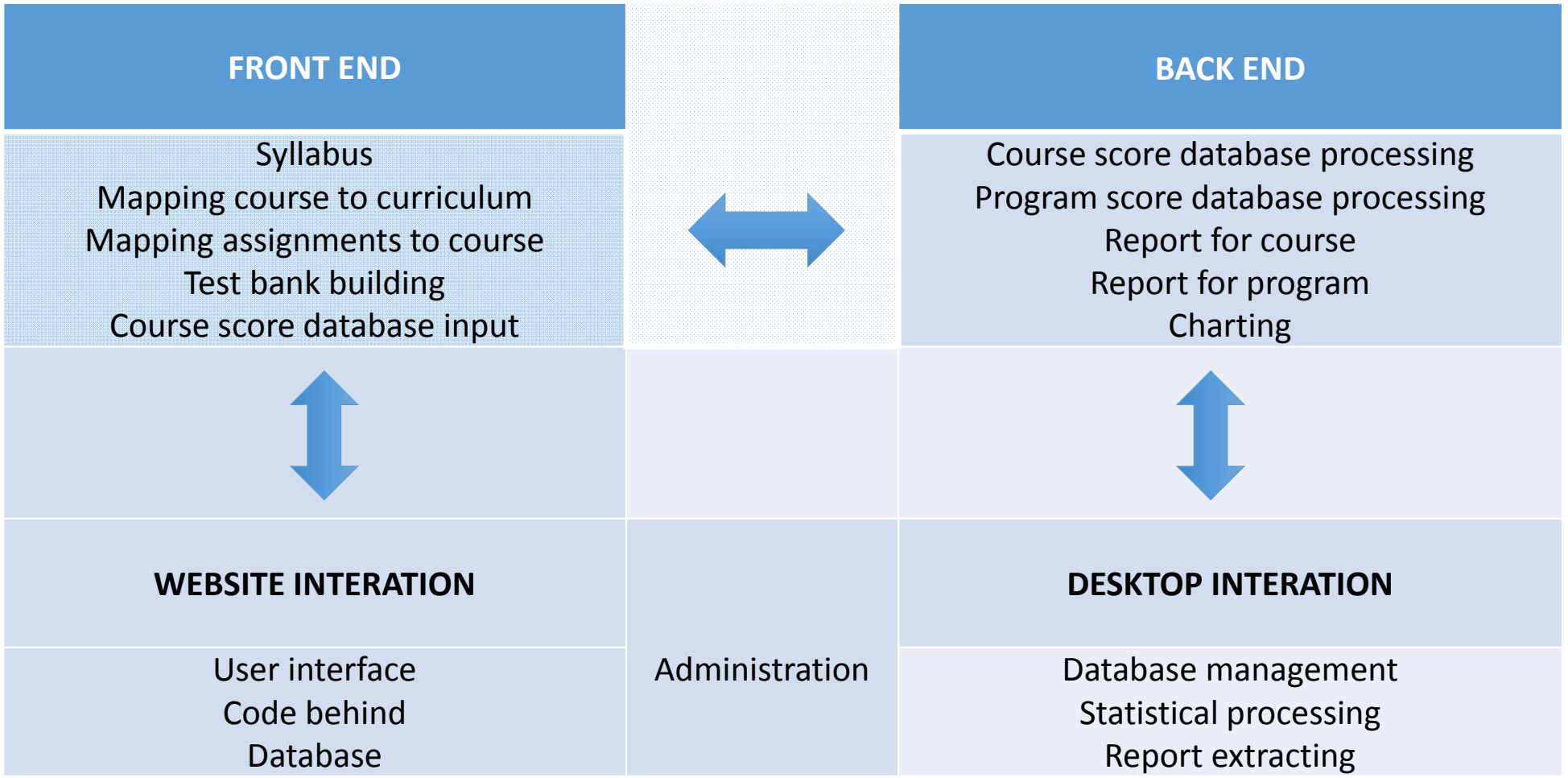
Average program learning outcome achievement in course

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

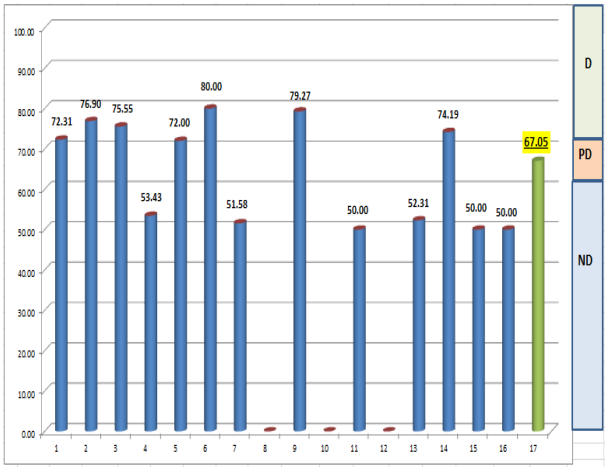
SO	Outcome in course average achievement	Outcome achievement distribution in course				
		5	4	3	2	1
a	3.7	0.0%	66.7%	33.3%	0.0%	0.0%
b	4.5	50.0%	50.0%	0.0%	0.0%	0.0%
c						
d	4.3	50.0%	33.3%	16.7%	0.0%	0.0%
e	3.5	16.7%	33.3%	33.3%	16.7%	0.0%
f						
g						
h						
i						
j						
k						
…						

Automatic assessment system overview

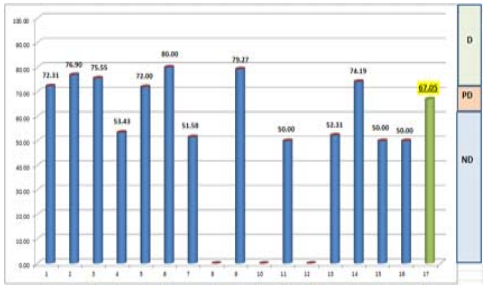


LOs Achievement Level and Graphical Presentation for each Faculty and Course

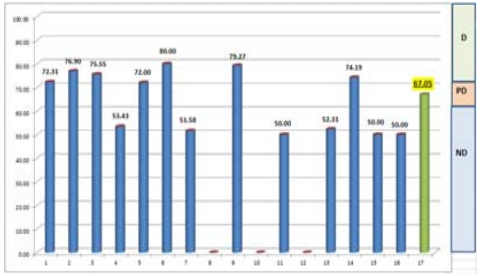
Dr. ***



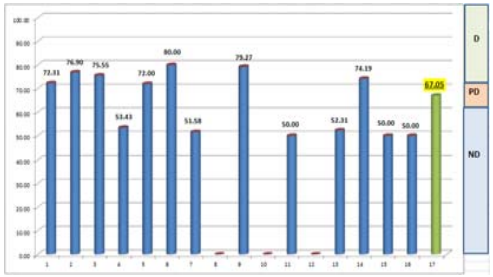
Course #1 Report



Course #2 Report

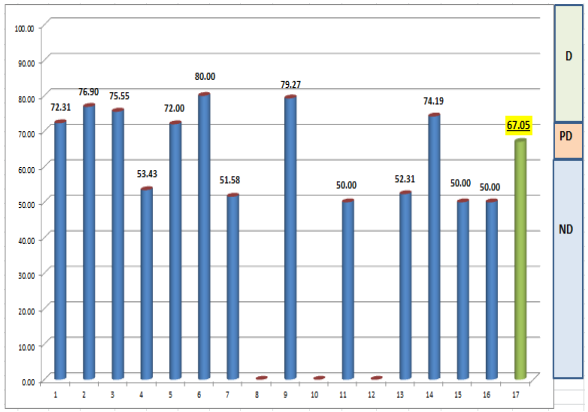


Course #3 Report

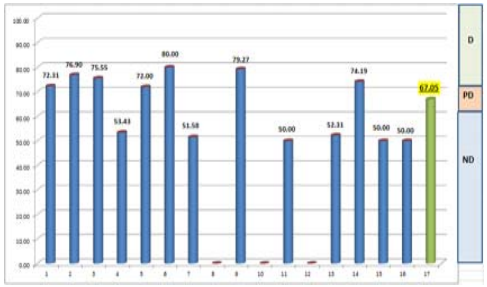


LOs Achievement Level and Graphical Presentation for each Program

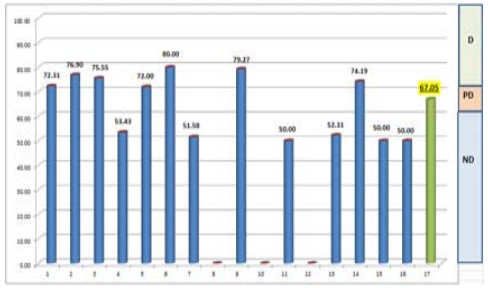
LOs : Program Level



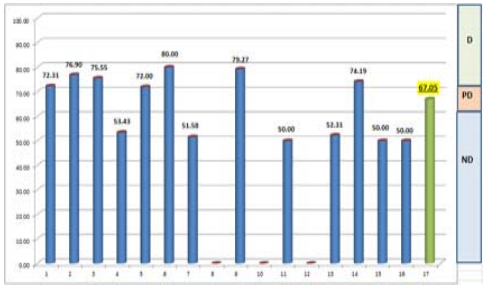
Dr. A



Dr. B



Dr. C



DEMO

Input Textbook & Test-bank

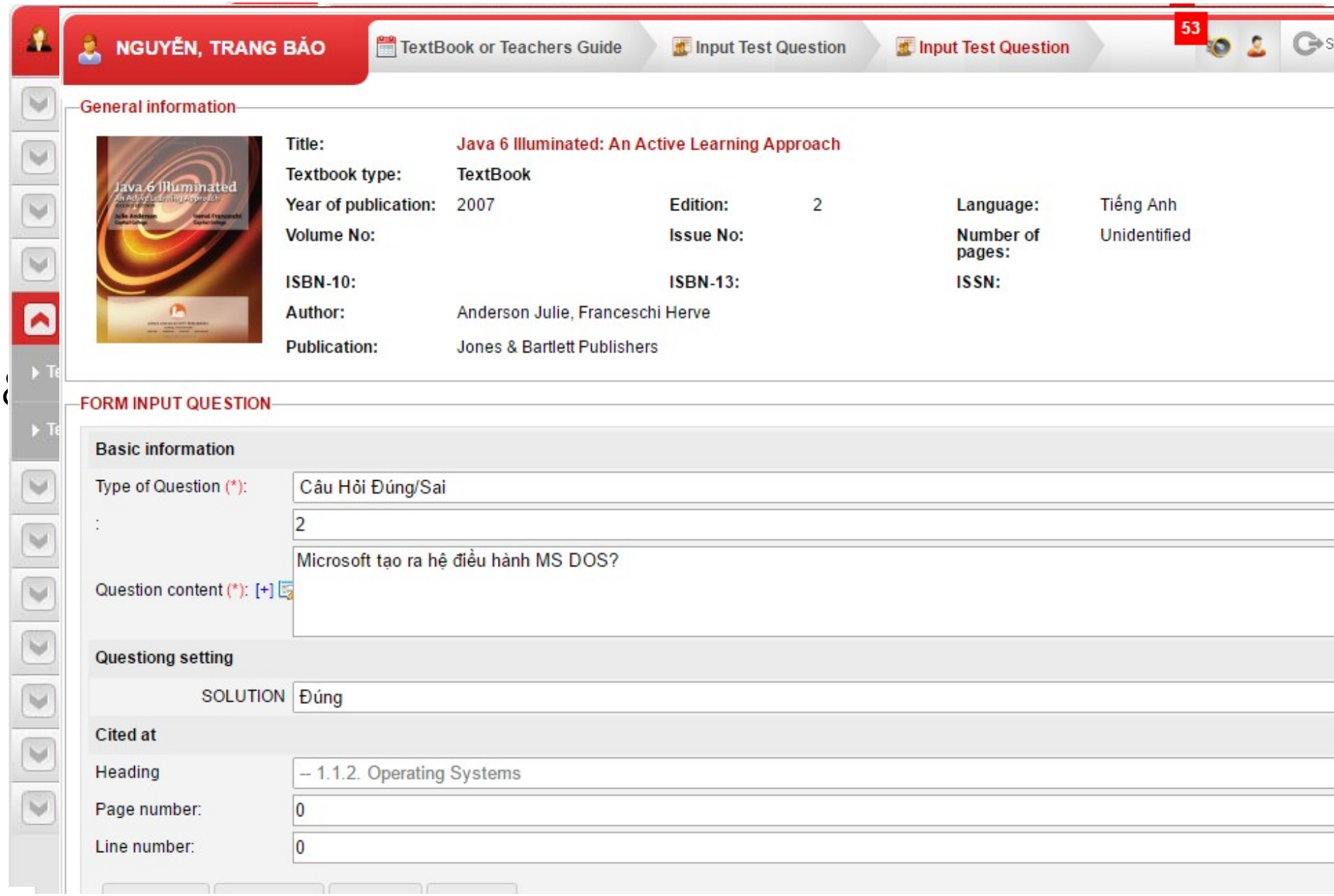
Mapping CLOs & SOs to Courses

Creating Assignments

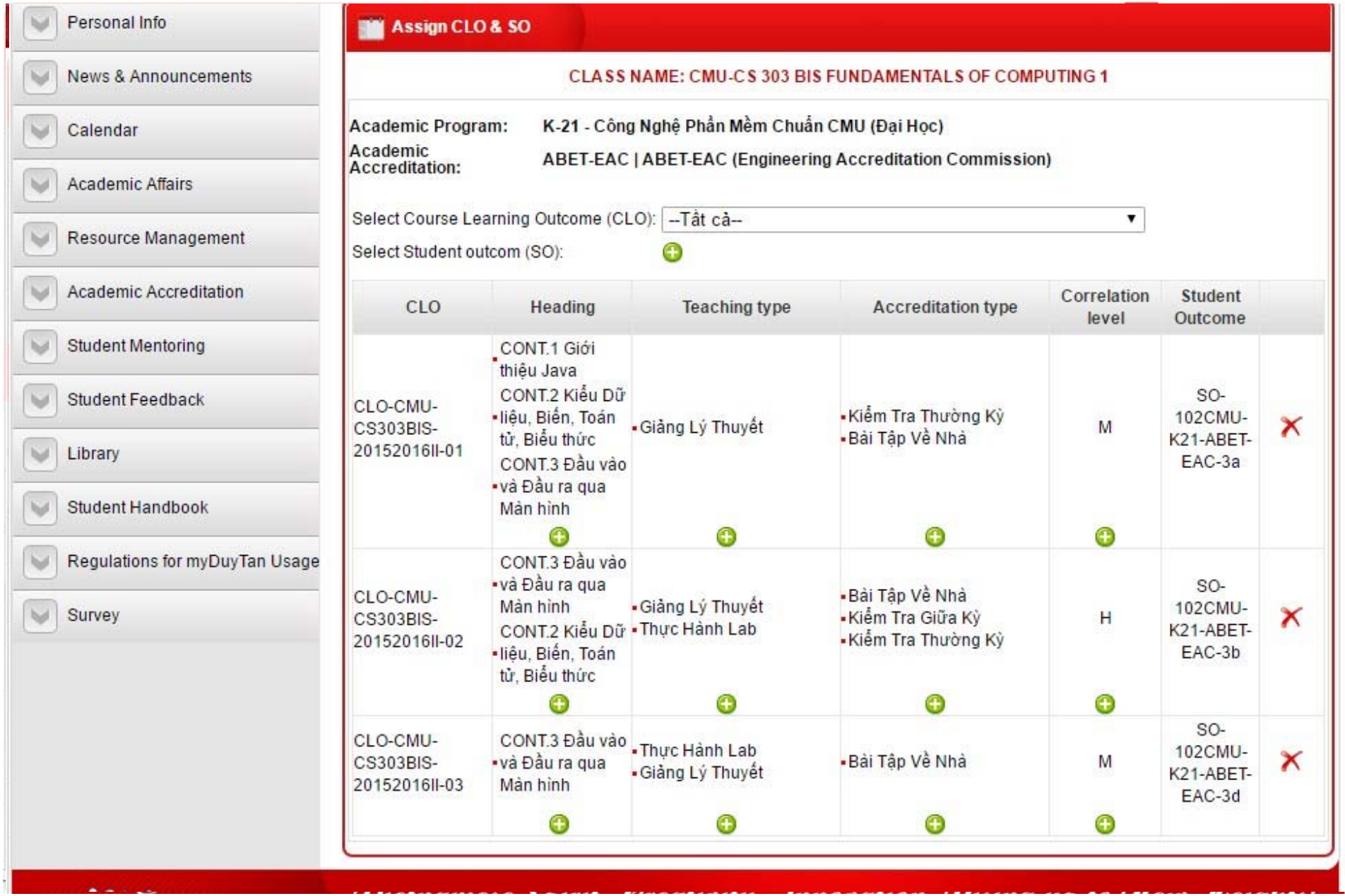
Mapping CLOs & SOs to every questions, rubric in any type off assessment

Output Report for Class, Course, and Program

Input
Textbook &
Test-bank

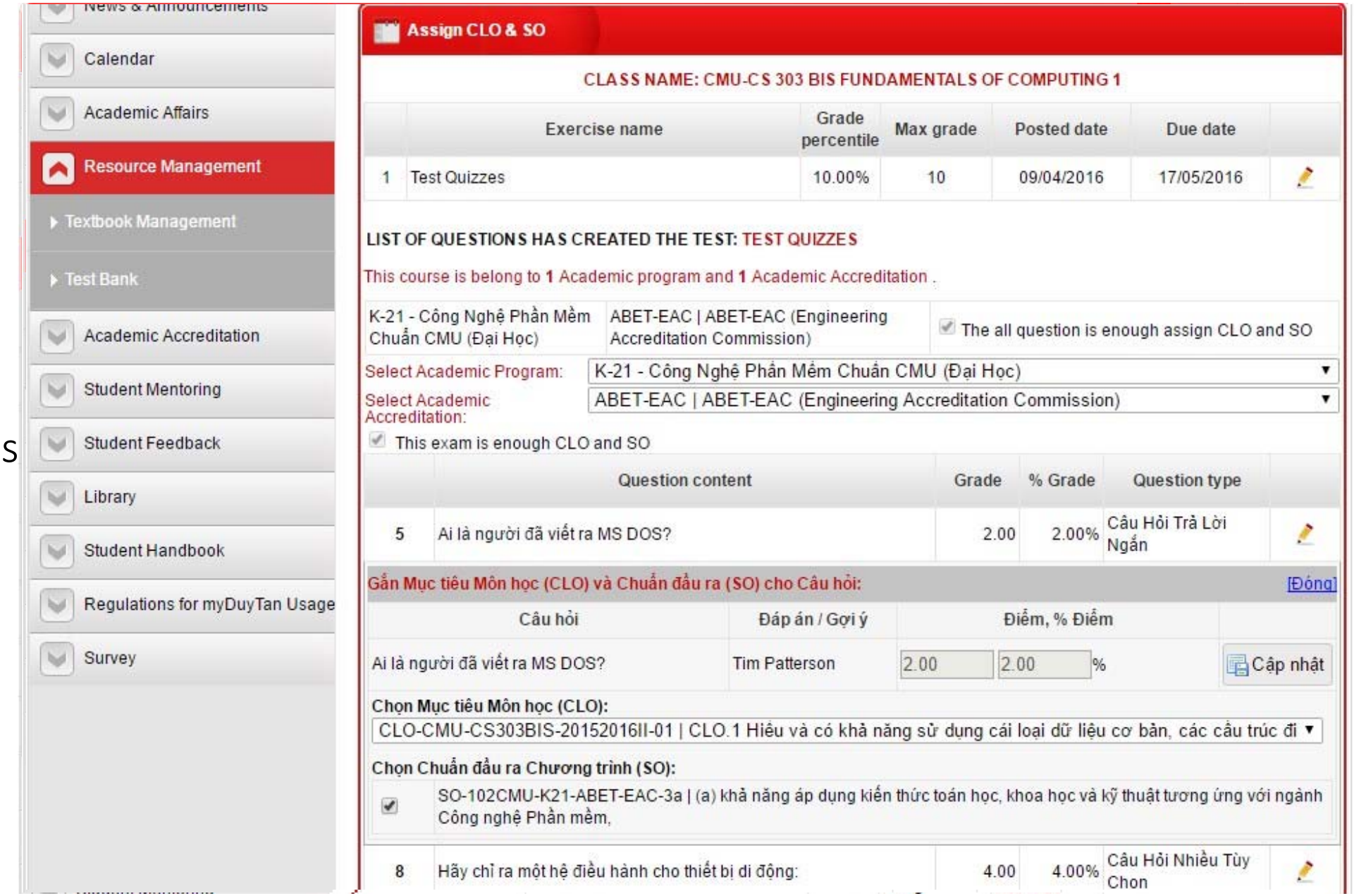


Mapping CLOs & SOs to Courses



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

Creating Assignments



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, Đình Quốc	Trương, Dũng Quang	Dươn Duy Nh	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

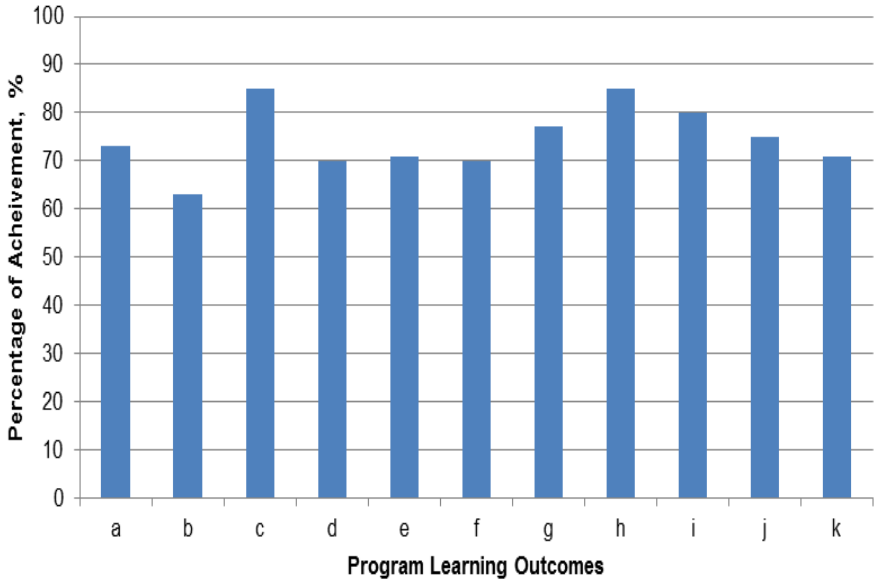
FIGURE 4.2: AVERAGE STUDENT OUTCOME ACHIEVEMENT

SO	Trần, Bảo Hoài	Huỳnh, Bình Quốc	Nguyễn, Bình Bắc	Nguyễn, Chung Hoàng	Nguyễn, Cường Mạnh	Lại, Đạt Tấn	Lê, Đạt Thành	Bùi, Đình Quốc	Trương, Dũng Quang	Dươn Duy Nh	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

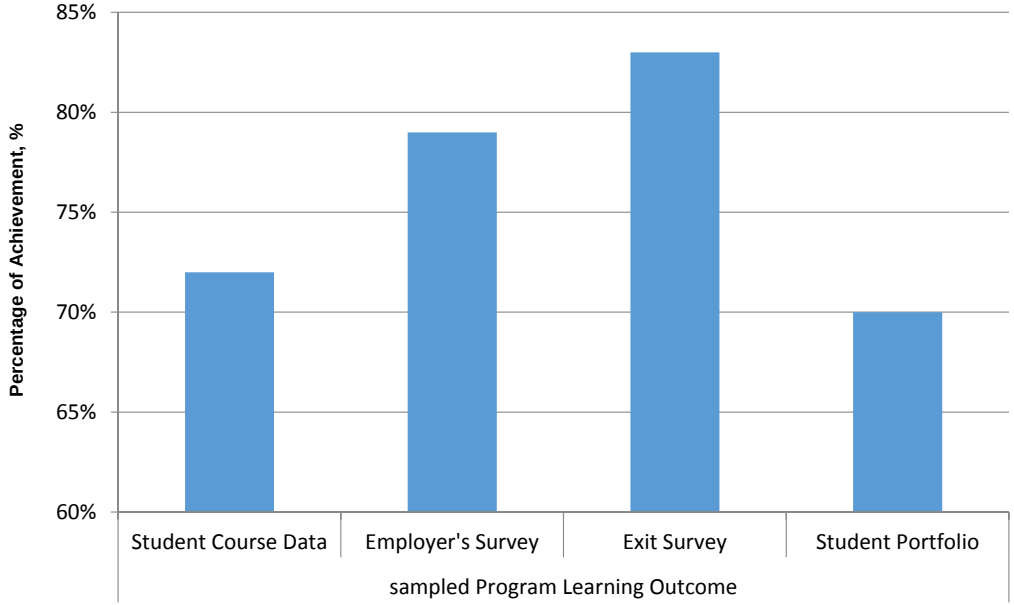
FIGURE 4.3: STUDENT OUTCOME ASSESSMENT DATA

SO	Overcome everage 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