University of Technology Sarawak

OUTCOME BASED EDUCATION

Prepared by:
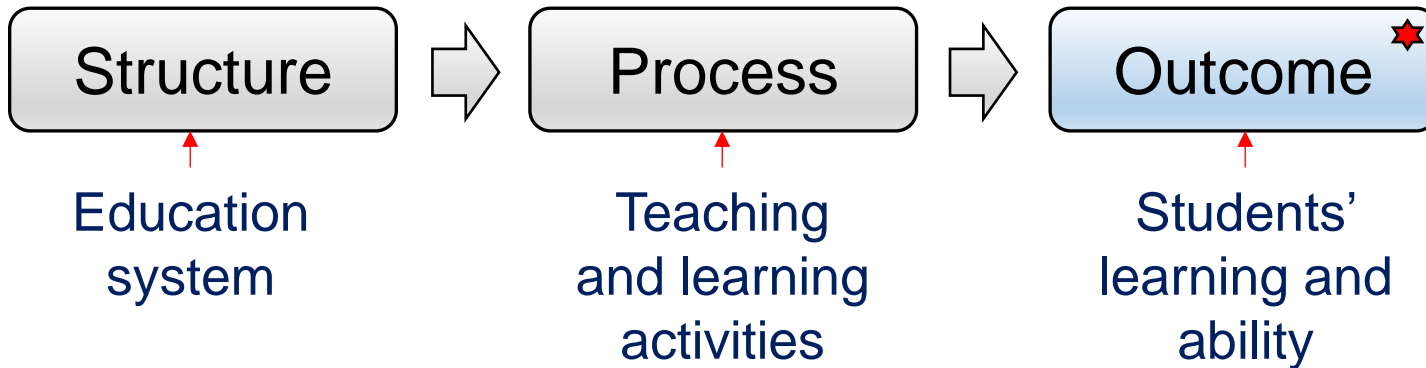ASSOC. PROF. DR. IR. LING JEN HUA

Learning Outcomes

After completion of this module, participants will be able to:

1. Apply the principles of Outcome Based Education (OBE)

Outcome-Based Education (OBE)

- Learner-centric approach
- It's not what we teach. It's what students learn.

Structure	⇒	Process	⇒	Outcome ⭐
↑		↑		↑
Education system		Teaching and learning activities		Students' learning and ability

Why OBE
- More directed & coherent curriculum
- Graduates more "relevant" to industry & stakeholders
- Continuous Quality Improvement in place

Learning outcomes

Functions of learning outcomes (LO)
- Define scope and depth of learning
- Guide **instructors**; curriculum, deliveries and assessment
- Communicates expectations to **learners**
- Inform **stakeholders**

LOs appears in the forms PEO, PLO, CLO, and TLO

Non-Engineering programmes	Engineering programmes
• Programme Educational Objectives (PEO)	• Programme Objectives (PEO)
• Programme Learning Outcomes (PLO)	• Programme Outcomes (PO)
• Course Learning Outcomes (CLO)	• Course Outcomes (CO)
• Topic Learning Outcomes (TLO)	• Topic Outcomes (TO)

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Constructing learning outcomes

SMART outcomes:
- **Specific**: to one learning behaviour
- **Measurable**: includes the criteria for success
- **Actionable**: can be demonstrated with evidence, or observed
- **Relevant**: to future experiences or work place
- **Timed**: to be achieved within certain time constraints

Evidence required

Focus on:
- what the learner has **achieved** rather than the intentions of the teacher
- what the learner can **demonstrate** at the end of a learning activity

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Learning Outcome - ABCD Model

Audience	• **Who** will be performing the behaviour?
Behaviour	• **What** behaviour should the learner be able to do? • an action verb
Condition	• Under what **conditions** should the learner be able to do? • Conditions when learners are demonstrating their mastery level (Resources, Environment, Deadlines)
Degree	• How well must it be done? • Standard by which **performance** is evaluated (Reference or Standards, Permissible Errors)

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Learning Outcome - ABCD Model

Examples

Upon successful completion of this course

+

(A) Audience
↓
students + should be able to:

(C) Condition
↓
+

(D) Degree
↓
orally explain five principles of theory X.
↑
(B) Behaviour

By the end of this course

+

(A) Audience
↓
students + should be able to:

(B) Behaviour
↓
+

(D) Degree
↓
design an **interactive** webpage **using macromedia**.
↑
(C) Condition

Learning Outcome

Ambiguous words to avoided

- Understand
- Recognize
- Believe
- Experience

- Realize
- Conceptualize
- Comprehend
- Memorize

- See
- Know
- Think
- Perceive

- Feel
- Hear

Ambiguous phrases to avoided

- Appreciation for
- Familiar with
- Capable of

- Awareness of
- Comprehension of
- Conscious of

- Interest in
- Knowledge of

Words in red: common mistakes

Outcome-Based Education (OBE)

Key Questions

What do you want the students to have or able to do? ⇨ Outcomes

How can you best help students achieve it? ⇨ T&L method

How will you know what they have achieved? ⇨ Assessment

How do you close the loop? ⇨ Continual Quality Improvement (CQI)

Outcome-Based Education (OBE)

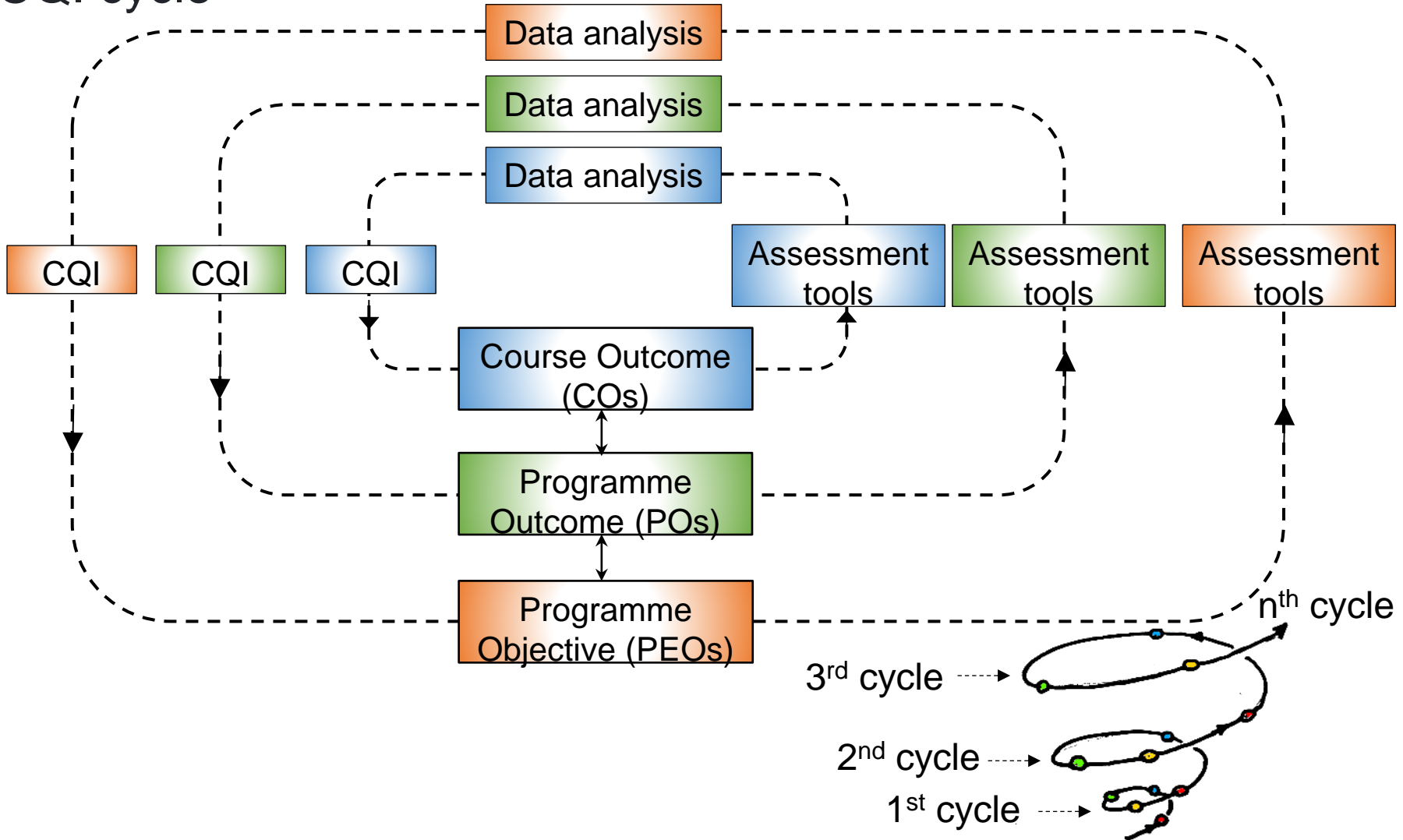| Outcomes	Frequency	Characteristics
Programme Objectives (PEO)	3-5 years after graduation	• Vision & mission • 2-4 PEOs • Surveys statistics
Programme Outcomes (PO)	Upon graduation	• Engineering Accreditation Council (EAC): 11 POs* • Graduate Attributes & Professional Competencies (GAPC) (International Engineering Alliance v4)* • Sustainable Development Goals (17 UN SDG) • Malaysian Qualifications Agency (MQA) • PO models (accumulating, dominating, culminating)
Course Outcomes (CO)	Semester, yearly	• 1CO:1PO • 2-4 COs
Topic Outcomes (TO)	Weekly, semester	• Topics • Formative / summative

+Continual Quality improvement (CQI)

Engineering programmes

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Outcome-Based Education (OBE)

CQI cycle

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Outcome-Based Education (OBE)

OBE is about closing the loop effectively

(a) PEO-PO-CO
- Proper alignment
- Strong correlation

(b) Assessment
- Appropriate tools
- Variety
- Appropriate nos.

(d) CQI
- Continuous improvement
- Measurable & achievable
- Effective

(c) Analysis
- Valid results
- Proper interpretation
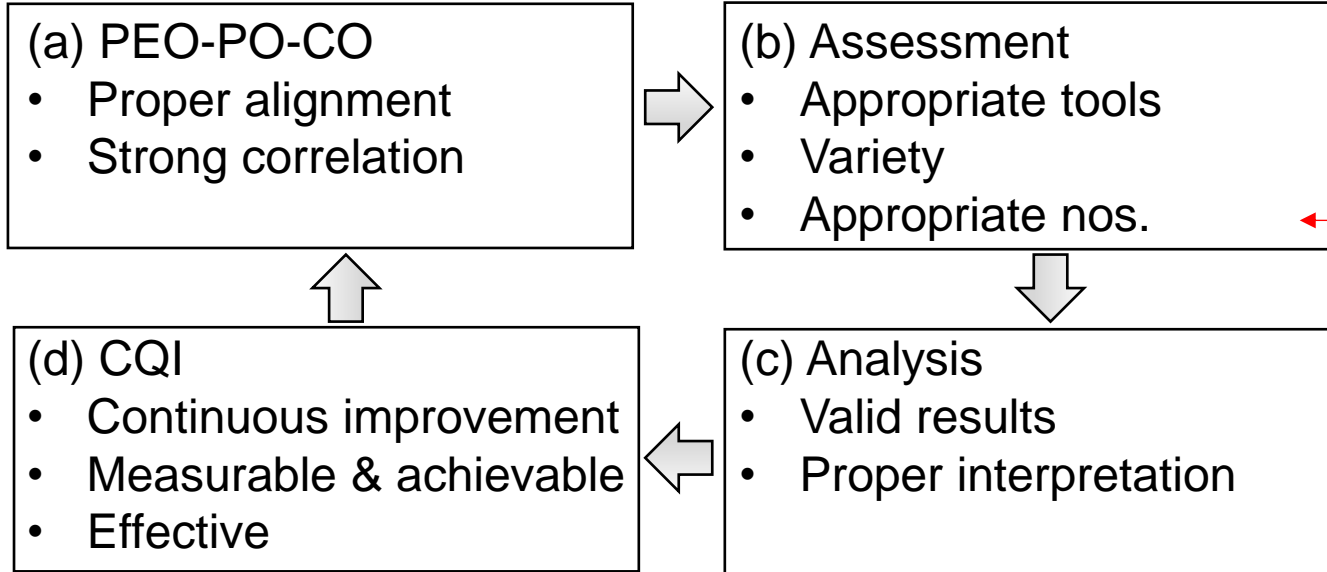
Just enough for good results
- Too much: overdone, high workload
- Too little: inaccurate results
- Sufficient variety to avoid bias

Basis
- Accurate measurement → less assessment tools
- Inaccurate measurement → more assessment tools

Components	Sequence	OBE
(a) + (b) + (c) + (d)	(a) → (b) → (c) → (d) → (a) …	√
(a) + (b) + (c) + (d)	(a) → (d) → (b) → (c) → (a) …	X
(a) + (b) + (c) + (d)	(a) → (b) → (c) → (d)	X
(a) + (b) + (c)	(a) → (b) → (c)	X
(a) + (b) + (c) + (d)	(a), (b), (c), (d)	X
(b) + (c)	(b) → (c) →(b) …	X

Improper sequence

No looping

No CQI

Not aligned

Not outcome based

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Alignment of CO, PO, PEO

(1) Programme design should be outcome-based, not content-based

(5) CO-PO-PEO must be strongly correlated for collective attainment

(2) Programme design top down

Programme

PEO1   PEO2   PEO3

PO1   PO2   PO3   PO4   PO5…

- CO1.1   - CO2.1   - CO3.1   - CO4.1   - CO5.1
- CO1.2   - CO2.2   - CO3.2   - CO4.2   - CO5.2
- …   - …   - …   - …   - …
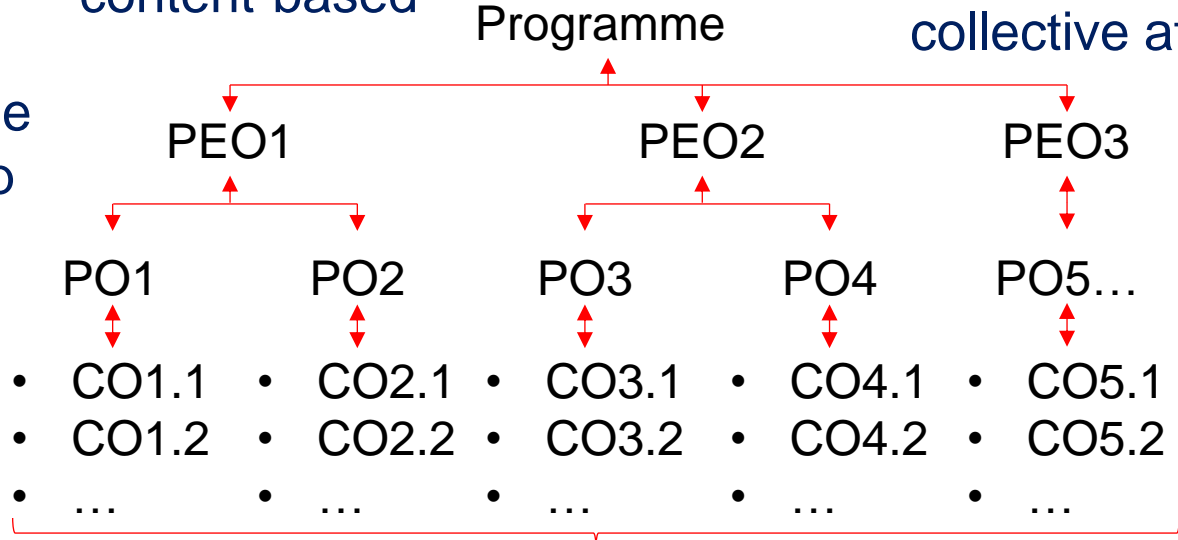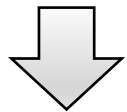
(3) Attainment analysis bottom up
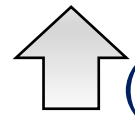
(4) Not merely grouping, mapping, or computing

(6) Only when the PEO-PO-COs are well aligned, the subsequently analysis is meaningful.

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Outcome Based Education (OBE)

```
            Verify   Survey results after 3-5 years
┌───────┐ ◄──────        • ≥2 assessment tools           Good assessment
│  PEO  │                                                 characteristics:
└───────┘               • Stakeholders, alumni, etc.
   ▲                                                         • Validity
Carry forward  Verify   Survey results on exit
   │      ◄──────                                            • Reliability
┌───────┐               • ≥2 assessment tools
│  PO   │                                                   • Integrity
└───────┘               • Graduates, culminating courses, etc.
   ▲                                                         • Currency
Carry forward      ┌─────────────────────────────┐
   │               │ Legend                       │         • Fairness
┌───────┐          │  ◄────   Direct measurement  │
│  CO   │          │                              │
└───────┘          │  ◄----   Assumption          │
   ▲               └─────────────────────────────┘
Analyse
Students' results
```
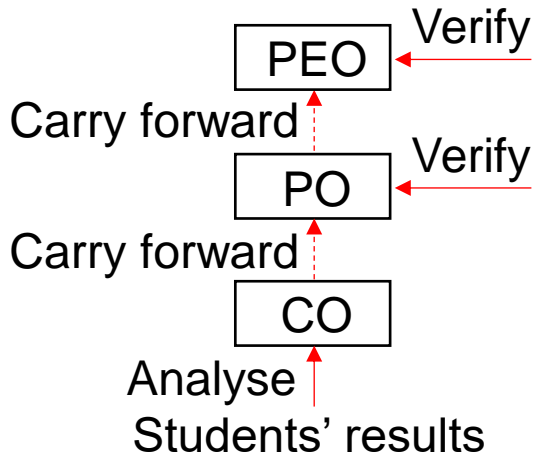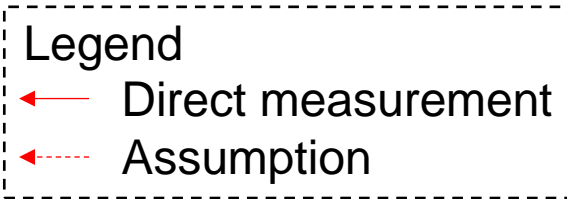
Assumptions

- Measured results & survey results appropriately reflect the actual condition
- CO attained → PO attained
- PO attained → PEO attained
- CO-PO-PEO properly aligned → good results for right evaluation

Definition of ≥2 assessment tools

- Different nature
- Mutually exclusive data set

Verification of the validity of measurement

- PEO: Assumed results ≈ Survey results
- PO: Assumed results ≈ Survey results
- CO: Validity of measurement

Findings

- Valid & reliable:
  - CQI to improve programme
- Invalid / unreliable:
  - CQI to improve measurement & OBE framework, and/or
  - CQI to improve programme

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CQI for PEO, PO, CO

Level	Aligned with	Analyse and action by	Frequency
PEO	Institutional vision, mission & goal	HOP / CQI coordinator / Dean	• By academic cycle (monitor) • By academic cycle + 3 to 5 years (confirmation) *(Optional)*
PO	11 IEA Graduate Attribute / EAC PO	HOP / CQI coordinator	• By annual (monitor) • By academic cycle (confirmation) *(Optional)*
CO	Course content	Course lecturer	• By 1/2 semester (monitor) • By semester (confirmation)
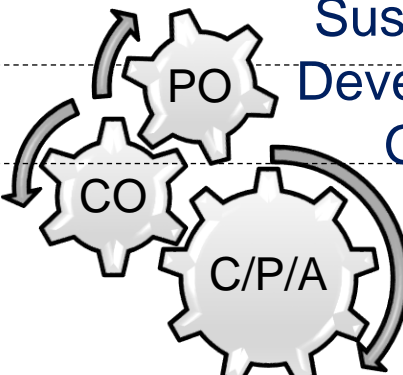
*subjected to programmes' OBE models

Curriculum

Engineering programmes

		Bachelor engineering B.Eng	Bachelor engineering tech B.Eng.Tech	Diploma engineering Dip.Eng / Eng. Tech
		Student Learning Time ↓		
Cognitive	C1-C6	≈ 70% SLT	≈ 50% SLT	≈ 50% SLT
Psychomotor	P1-P7	≈ 30% SLT	≈ 50% SLT	≈ 50% SLT
Affective	A1-A5	Mix & map	Mix & map	Mix & map
Sustainable Development Goals →		17SDG	17SDG	17SDG
		WP-EA	SP-TA	DP-NA
		Washington accord	*Sydney accord*	*Dublin accord*

PO
CO
C/P/A

Non-engineering programme subjected to the programme nature: e.g., 70:30, 60:40, 50:50, 40:60

Constructive Alignment

*Engineering programmes

Transferable skills
- Critical thinking
- Problem solving
- Creative thinking skills
- Management
- Leadership
- Teamwork
- Communication
- Analytical
- ICT
- Entrepreneurship

- CO-PO-PEO
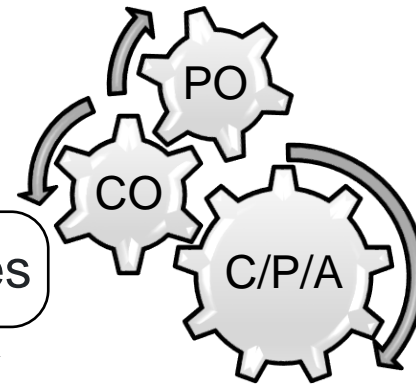
Learning outcomes

Elements
- 11WA*
- 9WK*
- 7WP*
- 5EA*
- 17 SDG

Closed loop

Instruction

Assessment

- Formative / summative
- Direct / indirect
- Course / programme level

Instruction learning
Teacher-centred learning (TCL)
Student-centred learning (SCL)
- Cooperative learning
- Collaborative learning
- Problem-based learning (PBL)
- Project-based learning (PrBL)
- Project-Oriented Problem Based Learning (PoPBL)

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The Golden Triangle

- Course outline

Course outcomes

- Teaching plan
- Project handout

- Result analysis
- Course performance and moderation form

- Exam moderation form
- Capstone project moderation form

Teaching & learning activities

Assessment

- Lecture notes
- Assignment
- Tutorial
- Presentation, etc.

- Progress test and marking scheme
- Final exam question paper and Marking Scheme
- Assignment assessment rubrics

CO1 — T&L ↔ Assess

CO2 — T&L ↔ Assess

CO3 — T&L ↔ Assess

*Everything discrete to and centred at CO

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OBE Curricula

Characteristics

- PEO, PO, and CO can be assessed and evaluated
- Meets students and stakeholders' needs
- Suitable performance indicators, criteria or rubrics
- POs address Knowledge, Skill & Attitude (C,P,A) to be attained by students
- COs satisfy POs.
- Each course address ≥1 POs
- ≥2 delivery methods.
- ≥2 assessment tools.

Stakeholders

- Malaysian Qualifications Agency (MQA)
- Ministry of Higher Education (MoHE)
- Engineering Accreditation Council (EAC)*
- Professional bodies, e.g., BEM, BQSM, PAM, etc.

      Relevant governing bodies

- Employers
- Industrial Training Supervisors
- Industry Advisory Panels (IAP)

      Industry

- External Examiners ← Field experts
- Graduates / Alumni ← Graduates
- Academic Staff
- Students

      UTS members

- Parents, general public, etc.

Engineering programmes

Employers rate candidate soft skills

1. Ability to verbally **communicate** with person inside and outside the organization
2. Ability to work in a **team** structure
3. Ability to make **decisions** and **solve problems**
4. Ability to plan, organize and prioritize work
5. Ability to obtain and process information
6. Ability to analyse quantitative data
7. Technical knowledge related to the job
8. Proficiency with computer software programs
9. Ability to create and/or edit written reports
10. Ability to sell or influence others

Importance ↑

Transferable skills:

Critical thinking, Problem solving, Creative thinking, Management, Leadership, Teamwork, Communication, Analytical, ICT, Entrepreneurship

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17 United Nation Sustainable Development Goals (SDGs)

- a blueprint for global peace and prosperity
- action by all countries
- worldwide guidance for addressing the global challenges

1. No Poverty
2. Zero Hunger
3. Good Health and Well-being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry, Innovation and Infrastructure
10. Reduced Inequality
11. Sustainable Cities and Communities
12. Responsible Consumption and Production

13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace and Justice Strong Institutions
17. Partnerships to achieve the Goal

OBE Curricula

Issues with curriculum
- Breadth and depth
- Constructive alignment ← Strong correlation CO-PO-PEO
- True attainment ← Reliable analysis
- Balanced: cognitive, psychomotor and affective ← All-round graduates
- Variety: delivery and assessment methods ← Prevent bias
- Student learning time (SLT)
- Benchmarking
- Programme Continual Quality Improvement (CQI)
- Quality Management System (QMS)
- 17 Sustainable Development Goals (SDG)

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Programme Objectives (PEO)

University / Faculty Mission & Vision ⬇	IHL Mission / Vision Statements • What's constitute behind the statement? • What are the indicators to measure the achievement of the Mission / Vision?
PEO Statements ⬇	PEO Statements ← **+ 17SDGs** • How does PEO relates to Mission / Vision? • Who are the stakeholders? • Where do you foresee your students 3-5 years after graduation? • What are their roles in organization and community? • How do they contribute to the achievement of Mission/Vision?
PEO Measurement	PEO Measurement • What are the indicators that show the PEO are being achieved? • From whom should we measure the achievement. • Where and When to measure? • How (Method/Tool) to measure? • What are you going to do with the data collected?

PEO Assessment

To establish graduates career pathway aligned to the qualification acquired and intended educational objectives attained

PEO assessment (3-5 years after graduation)

Indirect
- Employer survey
- Alumni survey

⟹ Perceived values

⇕ Verifications

Direct
- Professional membership
- Graduates career data

⟹ Facts and figures

PEO Assessment Process

Scrutinize PEO statements ⇨ Identify essential components ⇨ Set indicators ⇨ Assessment

- Custom-design
- % must represent great majority

	Example	Indicators
PEO1	To produce engineers with *sufficient knowledge and skills* in sync with appropriate attitude to succeed in *positions in civil engineering practice* and in other fields they choose to pursue	• 80% respondents of the alumni survey indicate that the curriculum provides sufficient knowledge and skills for them to practice as graduate engineers. *[Sufficient knowledge and skills]* • 80% of graduates are being employed in civil engineering or other engineering related fields. *[Positions in civil engineering practice]*
PEO2	To produce engineers with abilities for *effective communication, collaborative working* in diverse teams, and continual development through *professional involvement*.	• 80% respondents of the alumni survey indicate no difficulty in communicating in their fields of work. *[Effective communication, collaborative working]* • 80% of graduates involving in professional bodies (including professional engineers) *[Professional involvement]*
PEO3	To produce engineers who pursue *lifelong learning*, stay informed of current civil engineering practices and contemporary issues, and actively involve in research.	• 70% respondents of alumni survey indicate elements of lifelong learning related to the field of works in various means. i.e, either by demonstrating continual growth in the field of work (career advancement, working experience, expertise and portfolio), or by showing initiative of participating training programs, seminars, short courses, furthering studies (part-time or full-time), and etc. *[Lifelong learning]*

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Programme Outcomes (PO)

PO Development ⬇	**PO development** • Refer to Graduate Attributes and Professional Competencies (GAPC IEA v4)* • Engineering Accreditation Council (EAC) manual* • Code of practice for programme accreditation (COPPA)
PO Statements	**PO statement** ← **+ *9WK, *7WP, *5EA, 17SDGs** • Knowing exactly the expectation that graduate should achieved in each PO • Use appropriate verb • Identify domain and highest taxonomy level to be achieved. • Mapping To PEO • PO Distribution – Courses Mapping
PO Measurement & Delivery	**PO Measurement & Delivery** • What, when and where to measure PO • How to measure PO • What, when, where and how to deliver PO (T&L activities) • How to verify the result of PO achievement (Triangulation)

*Engineering programme

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EAC Programme Outcomes

Existing version (2020)

1. Engineering Knowledge
2. Problem Analysis
3. Design/Development of Solutions
4. Investigation
5. Modern Tool Usage
6. The Engineer and Society
7. Environment and Sustainability
8. Ethics
9. Individual and Team Work
10. Communication
11. Project Management and Finance
12. Life Long Learning

Latest version (2024)

1. Engineering Knowledge
2. Problem Analysis
3. Design/Development of Solutions
4. Investigation
5. Tool Usage
6. The Engineer and the World
7. Ethics
8. Individual and Collaborative Team work
9. Communication
10. Project Management and Finance
11. Lifelong learning

IEA

Upgraded.
Environment and sustainability blended in instead of standalone

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Learning Outcomes Clusters (MQA)

Pervious version (2008), 8 domains

1. Knowledge
2. Practical skills
3. Social skills and responsibilities
4. Ethics, professionalism and humanities
5. Communication, leadership and team skills
6. Scientific methods, critical thinking and problem solving skills
7. Lifelong learning and information management skills
8. Entrepreneurship and managerial skills

New version (2017), 5 clusters

1. Knowledge and Understanding
2. Cognitive Skills
3. Functional Work Skills
   - Practical work skills
   - Interpersonal skills
   - Communication skills
   - Digital skills
   - Numeracy skills
   - Leadership, autonomy and responsibility
4. Personal and entrepreneurial skills
5. Ethics and professionalism

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Distributing PO

Top down	• dictated by management team
Bottom up	• course owner identify PO to address • Map to POs and compile into programme structure.
Mix	• Bottom Up for draft mapping • Top down balancing

Programme
```
          ┌──────────────┼──────────────┐
        PEO1            PEO2           PEO3
      ┌────┼────┐    ┌────┼────┐         │
     PO1      PO2   PO3      PO4       PO5…
```

Top down or bottom up

• CO1.1	• CO2.1	• CO3.1	• CO4.1	• CO5.1
• CO1.2	• CO2.2	• CO3.2	• CO4.2	• CO5.2
• …	• …	• …	• …	• …
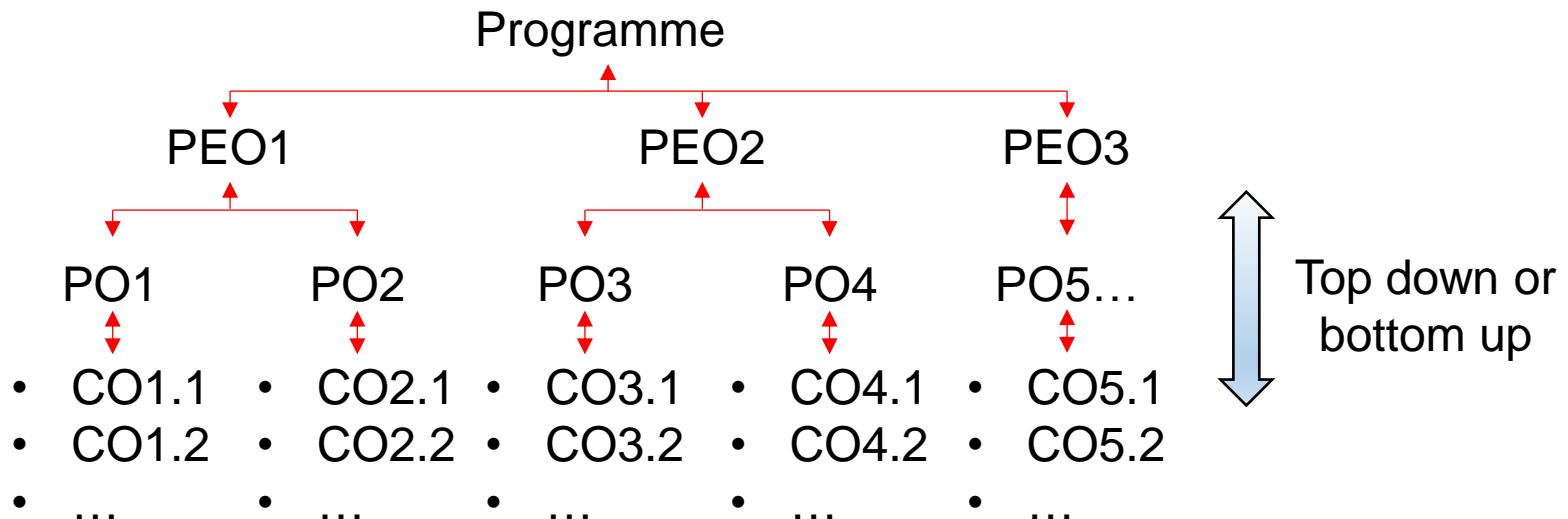
PO Assessment

To determine the extent to which a programme achieves its intentions.

PO assessment (upon graduation)

Direct
- assignment, test, final exam, report, presentation
- CO-PO measured directly and explicitly.

➩ Facts and figures (assumed)

⇕ Verifications

Indirect
- survey, questionnaire
- perceived value of learning experiences

➩ Perceived values
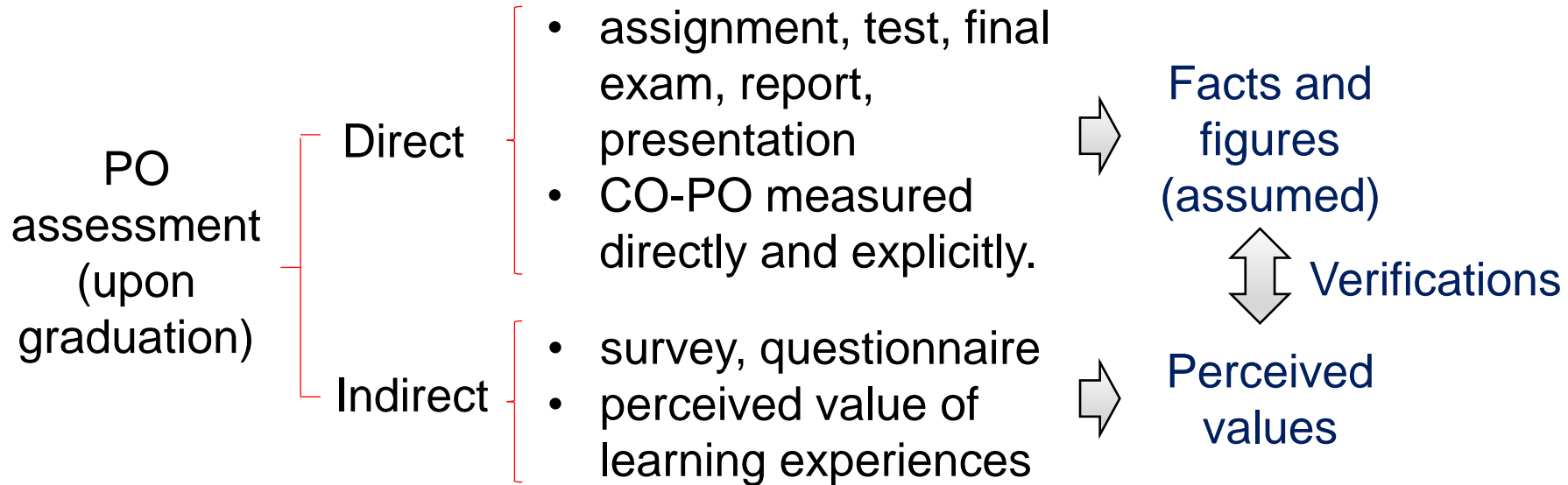
Assessment

- process of measuring, collecting and analysing data
- to analyse the achievement of the intended outcomes

Who to assess?	• Individual • group	• Programme • Course
What to assess?	• TO attainment • C/P/A	• CO, PO, PEO attainment, • Curricula, WK*, WP*, EA*, SDG
Why assess?	• improvement • Gatekeeping	• Improvement: curriculum, instructional practice, student services • Sustainability • Accountability: institution, public, resource provider • Accreditation: quality assurance, accrediting bodies
When to assess?	• Weekly • semester	• Semester • Annual • Academic cycle
How to assess?	• Formative • Summative	• Evaluation

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PO Assessment

PO assessment models
- PO attainment can be collected from few to several courses
- **Triangulation** is important to ensure **true attainment**
- E.g., External Examiner (EE) Report, Moderation of Examination Paper, Stakeholder Feedbacks

Model	PO measurements	
Accumulating	All courses	← • Traditional approach • Tedious analysis
Dominating	Selected core courses	
Culminating	Selected few (3-5 courses)	← • Simplified approach • Discrete & in-depth analysis • Verification is required

CO-PO MAPPING

- Traditional method
- Most Universities currently using
- Guided analysis method
- Using automated system

Example 1: Accumulative Model

Course	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	....
Course 1	CO1	/								
	CO2		/							
Course 2	CO1			/						
	CO2								/	
Course 3										
...										

All courses involved

Recommendations
- 1 course 3 - 4 CLO ← Culminating courses may have more CLOs
- CLO-PLO mapping 1:1
- ≥2 CLO attaining a PLO
- ≥2 CLO attaining each functional work skills (MQA) under PLO3
- Mechanism to quantify the level of attainment (%) ← Periodically reviewed, refined as necessary

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CO-PO MAPPING

- New method
- Probably the future trend
- Discrete & in-depth analysis
- Quality CQI

Example 2: Dominating / Culminating Method

Course	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	….
Course 1	CO1	/								
	CO2		/							
Course 2	CO1			/						
	CO2								/	
Course 3										
…										

Selected courses (core or culminating courses)

- True attainment
- Programme performance & CQI

Course level
- All CO are analysed

for evaluating course performance & CQI

Programme level
- ≥2 COs for each POs
- Not necessarily all CO in a selected course are considered in PO analysis
- All culminating courses must be considered (e.g. FYP, Integrated Design Project, Industrial Training, etc.)

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Attainment of Outcome

Example:

Represent passing marks of course

Level	Purpose	Requirements	Action by
Student level	Identify CLOs attained and not attained by an individual student	The student obtain ≥40% of total marks of a CLO	Course coordinator
Course level	Evaluate the effectiveness of the delivery and assessment methods in attaining all CLOs	≥80% of the students taking the course attained a CLO	Course coordinator, CQI coordinator
Programme level	Evaluate the effectiveness of the curriculum in attaining all PLOs	≥80% of the courses in a programme attained a CLO	CQI coordinator, Programme coordinator

*the requirements may change over time due to CQI

- Represent a good majority
- Minimum 2/3

Continual Quality Improvement (CQI)

- Systematic: defined objectives, performance metrics
- Dynamic: continuous pursuit of excellence
- Internalized: comes from within, not external factors
- Synchronized: PEO, mission & vision, stakeholders' need
- Regular / cyclical assessment: baseline for future assessment
- Processes well documented: report and data
- Not seeking to blame, but to improve processes.

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CQI cycle (Example)

CQI
- Additional support staff
- Addition PE
- Innovative teaching and learning
- Revision of PO
- Curriculum Review workshop
- External examiner visit
- Industrial advisory Panel visit
- Etc.

CQI
- Addition scopes for IDP
- Increase OEL level for CE labs I, II and III
- Practical test for CE labs I, II and III
- Presentation of for all courses
- String-lining IBA
- External examiner
- IAP evaluation on FYP, IDP and IBA

Performance Indicator of PO
- The courses attain PO when 80% students attain the respective CO
- A PO is attained when ≥80% of the courses addressing it attain it.

Analysis of previous CQI actions
- Compulsory presentation: students' communication skills improved
- IDP: Project management skill improved
- Formalized CQI - systematic tracing of previous CQI record.
- Systematic monitoring of WP and EA

CQI
- OBE and curriculum review, after alumni survey and EAC accreditation
- Review of key competency indicator
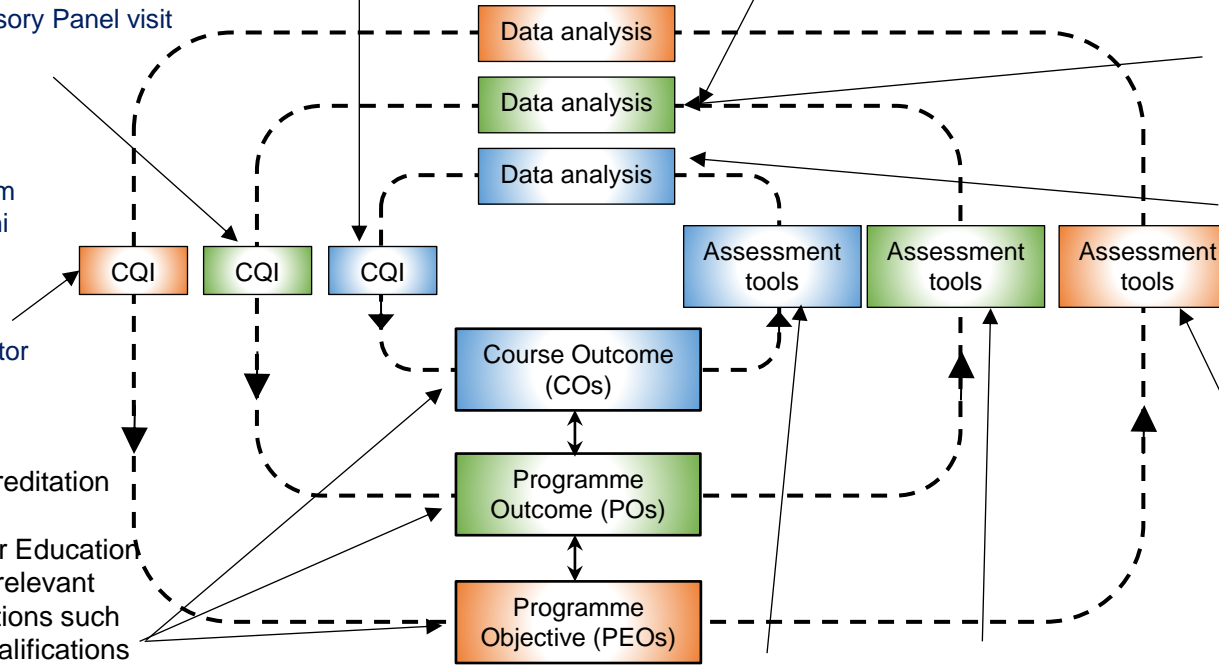
Performance Indicator of CO
- Student attains CO when obtain ≥40% out of the total marks addressing the CO
- Course attains CO when 80% students attain the CO

Stakeholders
- Engineering Accreditation Council (EAC)
- Ministry of Higher Education (MoHE) and the relevant governing institutions such as Malaysian Qualifications Agency (MQA)
- Employers
- Industrial training supervisor
- Industry Advisory Panels (IAP)
- External Examiner
- Graduates / Alumni
- Academic Staff
- Students

Data analysis

CQI

Course Outcome (COs)

Programme Outcome (POs)

Programme Objective (PEOs)

Assessment tools

Assessment tool of CO
- Reports (assignment, laboratories, fieldworks, projects, site visit, etc.)
- Presentation slides
- Final Year Project report
- Industrial training report
- Progress Test and Final Exam answer scripts
- Course Feedback Report

Assessment tool of PO
- Course Feedback Report (sem)
- Programme Review Report (sem)
- Industrial Training Survey (yearly)
- Employer Survey (yearly)
- Exit Survey (yearly)
- Alumni Survey (yearly)
- Teaching evaluation (sem)
- External Examiner (yearly)
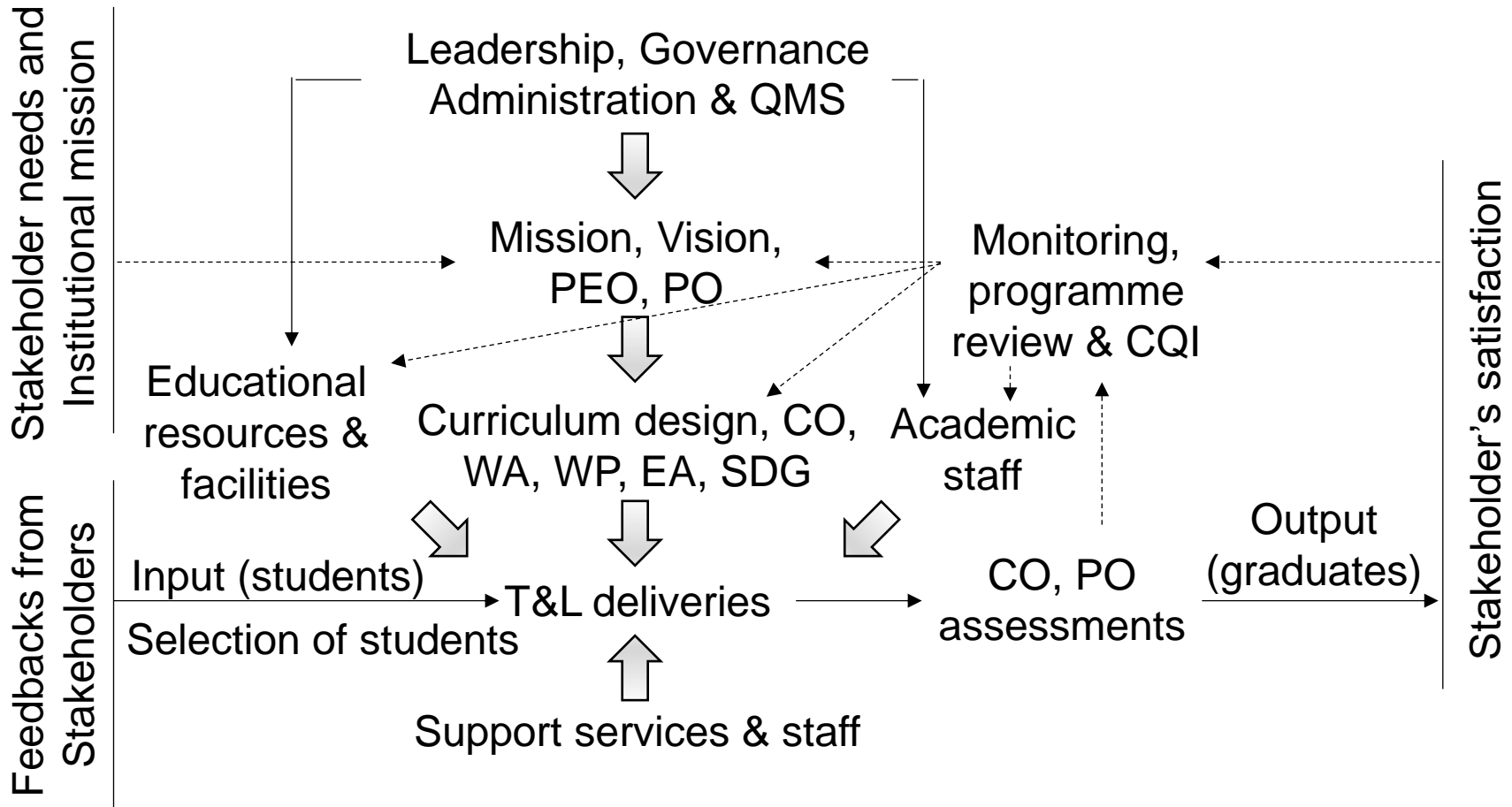- Industry Advisory Panel (yearly)

Assessment tool of PEO
- Employer survey
- Alumni survey
- Tracer survey
- Industrial training survey
- Industrial Advisory Panel
- External Examiner

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CQI is the HEART of OBE

Systematic pursuit of excellence and satisfaction of the needs of stakeholders, in a dynamic and competitive environment
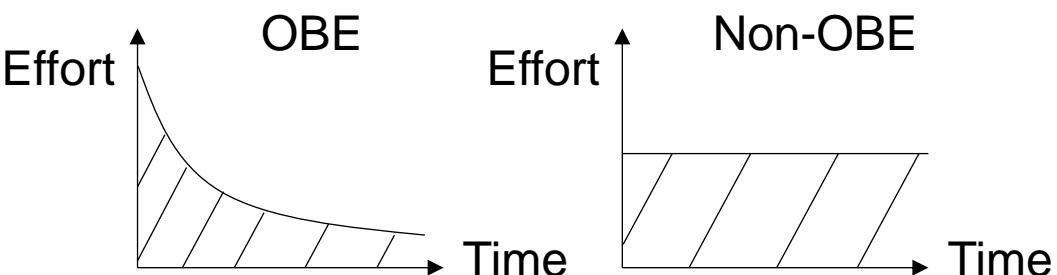

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Misconceptions

Misconception	Correction
OBE won't work. It is as good as without it.	Mimicking the format without knowing the essence makes it serve no purpose.
OBE is a waste of time.	Much time is invested at the initial stage. Time saving in long run.
OBE imposes so much workload.	Overdoing it lead to excess of work.
OBE makes things complicated.	True master makes complicated things simple.
OBE is very rigid and restrictive. Thus, it is an "old school".	It facilitates CQI. It promotes creativity and flexibility. A programme adopting OBE can be very unique, dynamic and up-to-date.
OBE is all about CO, PO, PEO. It is all about documentations.	Emphasising the format & template misses the true spirit of OBE (i.e sustainability)
CQI should focus on T&L	CQI should be in all aspects, including the OBE implementation model itself.

OBE   Non-OBE

Effort   Effort

Time   Time

When time = infinity, area below the graph of OBE <<< traditional
- Initial stage: setting up system
- Intermediate stage: fine-tuning system
- Later stage: programme CQI

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Conclusion

- OBE is a tool to manage a programme.
- The spirit of OBE is **CQI & sustainability**. Trial and error is often inevitable.
- Using the right assessment tools for the right outcomes is the key.
- Know the purpose and know what you are doing
- Ultimate goal: effectiveness and efficiency
  - minimum effort (time, people and resources) with
  - maximum output (valid, reliable, accurate results + effective responsive actions)

Hamster wheel

Never ending rotation (i.e. problems keep recurring)?

Attitude		Outcomes
Just do it, don't think	→	Going nowhere, endless recurring problems
Adding complexity	→	Wheel goes faster
Make it looks fancy	→	Decorating wheels; more friction, missing key point

Challenges to CQI : to get off the hamster wheel

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Overview Summary

1. Learning Outcomes (LO)
2. Outcome Based Education (OBE)
3. Continual Quality Improvement (CQI)

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