




Developing LOs

Muhammad Fahmi Bin Miskon, PhD

- 
- In UTEM since 21st of January 2002
 - Experience related to topics:
 - Mantan Ketua Jabatan Mekatronik, FKE, UTeM
 - Ketua JK OBE FKE
 - AJK Perlaksanaan OBE UTEM
 - AJK Pembangunan Sistem MyOBE UTEM
 - Active Learning Team Members
 - Auditor MYQUEST

Hello!

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- **Morning** : **How to write LO**
- **Afternoon** : **Workshop Session**

Tentative

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Outcome Based Education (OBE) is a current requirement in the implementation of academic programmes at institutions of higher learning. This course introduces participants to the establishment of Learning Outcomes, which consist of Programme Educational Objectives (PEO), Program Outcomes (PO) and Course Outcomes (LO).

Synopsis

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At the end of the course, participants should be able to:

- *Explain the steps in developing learning outcomes based on taxonomy level, SMART criteria and stakeholders' requirements*
- *Develop learning outcomes and their mapping based on taxonomy level, SMART criteria and stakeholders' requirements*

Learning Outcomes

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- *Aligning the Learning Outcomes Statement with UTeM 's Vision and Mission*
- *Definition of PEO, PO and LO and Their Importance in Curriculum Design*
- *Writing LO Statements – Verb, Noun and Standard*
- *Steps to establish General Educational Goals, Programme Educational Objectives (PEO), Program Outcomes (PO) and Course Outcomes (LO)*
- *FAQ*
- *Workshop activities*

Presentation Contents

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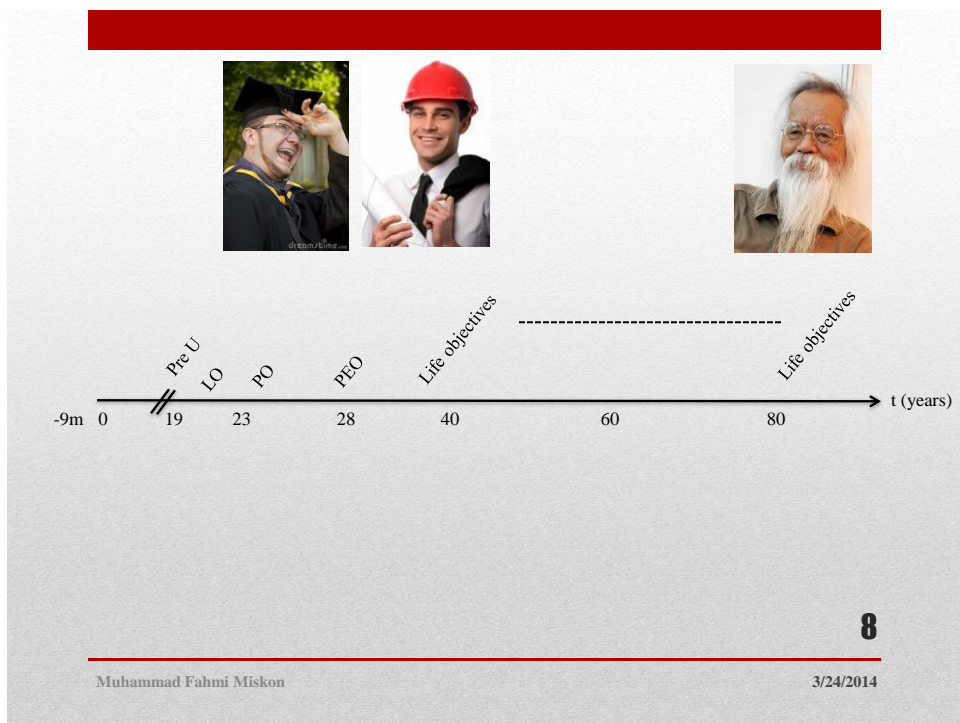
Begin with the end in mind

Outcome Based Education

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- Firman Allah swt dalam surah ad-Dzariyat ayat ke-56

وَمَا خَلَقْتُ الْجِنَّ وَالْإِنْسَ إِلَّا لِيَعْبُدُونِ

Ertinya: “Tidak Aku ciptakan jin dan manusia melainkan hanyalah untuk beribadah kepada-Ku”

Life objectives

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- Is there any other objectives for a program to exist other than educational objectives?
- What is the educational objectives of an academic program?

Program Educational Objectives

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Consider this situation

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- To produce highly skill workers in a respected field

PEO

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11 industry sectors were prioritised in addition to Greater KL/KV



Agriculture			
No	EPPs	2020 GNI (millions)	Jobs
1	Agriculture - EPP 1: Unlocking value from Malaysia's biodiversity through herbal products	2,213.9	1,822
2	Agriculture - EPP 2: Expanding the production of swiftlet nests	4,541.2	20,800
3	Agriculture - EPP 3: Venturing into commercial scale seaweed farming in Sabah	1,410.6	12,700
4	Agriculture - EPP 4: Farming through integrated cage aquaculture systems	1,383.0	10,072
5	Agriculture - EPP 5: Rearing cattle in oil palm estates	150.0	3,600
6	Agriculture - EPP 6: Replicating integrated aquaculture model (iZAQs)	1,273.2	11,890
7	Agriculture - EPP 7: Upgrading capabilities to produce premium fruit and vegetables	1,571.5	9,075
8	Agriculture - EPP 8: Strengthening the export capability of the processed food industry	884.3	4,928
9	Agriculture - EPP 9: Introducing fragrant rice variety for non-irrigated areas	100.1	N/A
10	Agriculture - EPP 10: Scaling up and strengthening paddy farming in Muda area	1,033.6	(14,880)
11	Agriculture - EPP 11: Scaling up and strengthening of paddy farming in other irrigated areas	1,370.3	(9,618)
12	Agriculture - EPP 12: Strengthening current anchor companies in cattle feedlots	182.9	2,000
13	Agriculture - EPP 13: Establishing dairy clusters in Malaysia	326.3	761
14	Agriculture - EPP 14: Establishing a leadership position in regional breeding services	466.6	5,390
15	Agriculture - EPP 15: Securing foreign direct investment in agriculture biotechnology	819.9	1,208
16	Agriculture - EPP 16: Investing in foreign cattle farming	116.5	N/A

- **Ways of thinking.** Creativity, critical thinking, problem-solving, decision-making and learning
- **Ways of working.** Communication and collaboration
- **Tools for working.** Information and communications technology (ICT) and information literacy
- **Skills for living in the world.** Citizenship, life and career, and personal and social responsibility

21st Century Skills

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- Desired abilities needed to meet the Program Educational Objectives
- Includes abilities to apply knowledge, attitude and skills

Program Outcomes

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- Desired abilities needed to meet the Program outcomes
- Listing all course outcomes is too lengthy to represent a program so course outcomes are mapped to the program outcomes instead

Course Outcomes

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WRITING OBJECTIVES AND OUTCOMES

- Administrative devices
- Clarify thinking of team of lecturers
- Provide expectation for students
- Provide good basis for reviewing effectiveness of our program
- Guide stakeholders about the nature of our program

Source: Professor Sally Brown, Pro-Vice-Chancellor, Provost and Director: Assessment, Learning & Teaching, Leeds Metropolitan University

Why need good Outcomes? 19

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- Collective effort
- Include opinion and information from stakeholders

Who should write outcomes?

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STEPS TO PRODUCE GOOD LEARNING OUTCOMES

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1. Comprehend stakeholders requirements
2. List the desired 'noun'
3. Give certain 'standards' to the 'noun'
4. Determine 'verb' to indicate the taxonomy level
5. Ensure SMART criteria is fulfilled
6. Identify how outcomes are connected

The Steps

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Activity: Try to comprehend and analyze

1. PO suggested in the new EAC manual 2012
2. MOHE softskill attributes

Step 1: Comprehend stakeholders requirements

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At the end of the program, students should have the ability to

(verb: conduct)

(noun: investigation into complex mechatronics engineering problems)

(standard: using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions)

Example of a LO

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At the end of the program, students should have the ability to
(verb: conduct)

(noun:

1. investigation into
2. complex problems
3. in mechatronics engineering)

(standard: using research based knowledge and research methods including

1. design of experiments,
2. analysis and interpretation of data,
3. and synthesis of information to
4. provide valid conclusions)

Step 1: Comprehend stakeholders requirements

Comprehend the noun and standard

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1. Investigation:

A detailed inquiry or systematic examination

2. Complex engineering problems

1. Involve the use of diverse resources
2. Interaction with wide ranging issues
3. Involve creative use of engineering principles and research based knowledge
4. Have consequences to society and environment
5. Familiarity to the problem is low

3. Mechatronics

“Synergistic integration of

1. mechanics,
2. electronics,
3. control theory,
4. and computer science

within product design and manufacturing, in order to improve and/or optimize its functionality”.

Step 1: Comprehend stakeholders requirements

Comprehend the noun used

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using research based knowledge and research methods including

1. design of experiments
 1. validity issues
 2. replicability
 3. similitude
 4. robustness of test
 5.
2. analysis and interpretation of data
 1. Statistical
 2. Time domain analysis
 3. Frequency domain analysis
 4.
3. and synthesis of information
 1. link
 2. change
 3. difference
 4. ...
4. to provide valid conclusions

Step 1: Comprehend stakeholders requirements

Comprehend the standard used

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- Noun refers to the body of knowledge where the learners could show his/her ability
- For example, ability to design is applicable to different noun such as electronic circuitry, control systems, mechanisms etc.
- For engineering programs, we could analyze systems and process that represent the program's niche to identify the desired noun

Step 2: List nouns

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- Standards acts as a definitive boundary to the environment that have been identified
- For example, in ‘the ability to design a car’, the standard could be ‘with appropriate consideration for safety and environmental factor’

Step 3: Give standards to the noun

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- Categorized into Cognitive, Affective, and Psychomotor domain
- Use verbs that indicates the highest level that we want the student to achieve

Step 4: Determine ‘verb’ to indicate the level of Bloom’s Taxonomy

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- Remembering: Recall data or information (define, list, recognize)
- Understanding: Understand the meaning, translation, interpolation, and interpretation of instructions and problems (characterize, describe, explain, identify, locate, recognize)
- Applying: Use a concept in a new situation (choose, demonstrate, implement, perform)
- Analyzing: Separates material or concepts into component parts so that its organizational structure may be understood (analyze, categorize, compare, differentiate)
- Evaluating: Make judgments about the value of ideas or materials (assess, critique, evaluate, rank, rate)
- Creating: Builds a structure or pattern from diverse elements (construct, design, formulate, organize, synthesize)

E.g. Cognitive Domain

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- Understand
- Appreciate
- Know about
- Become familiar with
- Learn about
- Become aware of

Verbs to avoid

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- **S**pecific
- **M**easurable
- **A**chievable
- **R**elevant
- **T**ime-Bound

Step 5: Ensure SMART

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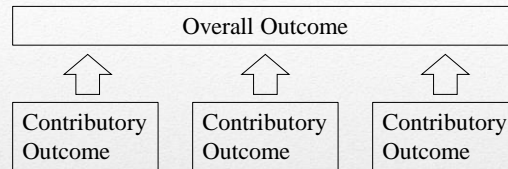
The objectives of this							
Concept	program is to produce, after 5 years of graduation,	Related to PO	(S)pecific	(M)easurable	(A)ttainable	(R)elevant	(T)ime bound
Apply engineering knowledge and contribute to respected field	Engineers who practice Mechatronics engineering knowledge in related field such as automotive, manufacturing and R&D of consumer products.	1,2,3,4,5	By program niche area	No. of graduate working in related field.	Achievable in 5 years	Relevant to UTEM vision and Malaysia's market	5 years
Technical Career	Engineers who attain senior engineer position or equivalent.	6,7,8	Specific position	No. of graduate holding higher position than fresh graduate position	Achievable in 5 years	Relevant to UTEM mission to produce highly competent professionals	5 years
Lifelong learning	Engineers who practice lifelong learning and adapt to constantly evolving technology	9,10,11	Specific to measurement. Refer to Measurable column.	a. No. of graduate further study b. No. of seminar/courses attended every year c. No. of competent certificate	Achievable in 5 years	National Aspirations & Agenda. Ch 8 PSPTN	5 years

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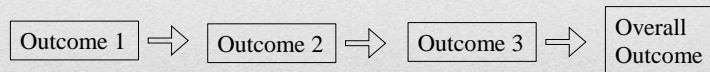
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Hierarchical Form



Sequential form



Step 6: Map link

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FREQUENTLY ASK QUESTIONS

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- Too many, student and lecturer will be overwhelmed
- Too few, the target and the mapping of assessment will be vague
- Make it so that it is manageable for assessment purpose and could show clear target to the student and lecturer

How many LOs?

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- Yes but with consideration
- Consider the following quote “Are we still based on text book when developing our delivery planning? If yes, that is still content based, that is not OBE! What we do is we try to force feed OBE to existing curriculum, this approach is self defeating”, Gloria Rogers, ABET 2011.

LO based on book content? 38

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WORKSHOP

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- 
- Form a group of 12 to discussed in detail all POs listed in the EAC manual
 - Analyze the PO using your expert opinion as well as reference from MOHE elaboration of desired soft skills
 - Create course outcomes based on the POs without being restricted to any known course. Assume course does not exist yet.
 - Plan the connection of the course outcomes
 - Timing: Discussion 1 hour, Presentation 10 minutes each

Workshop

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