

OUTCOME BASED CURRICULUM DESIGN

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EXHIBIT 1.1 Prescriptive Definitions of Curriculum

Date	Author	Definition
1902	John Dewey	Curriculum is a continuous reconstruction, moving from the child's present experience out into that represented by the organized bodies of truth that we call studies . . . the various studies . . . are themselves experience—they are that of the race. (pp. 11–12)
1918	Franklin Bobbitt	Curriculum is the entire range of experiences, both directed and undirected, concerned in unfolding the abilities of the individual. (p. 43)
1927	Harold O. Rugg	[The curriculum is] a succession of experiences and enterprises having a maximum lifelikeness for the learner . . . giving the learner that development most helpful in meeting and controlling life situations. (p. 8)
1935	Hollis Caswell in Caswell & Campbell	The curriculum is composed of all the experiences children have under the guidance of teachers. . . . Thus, curriculum considered as a field of study represents no strictly limited body of content, but rather a process or procedure. (pp. 66, 70)
1957	Ralph Tyler	[The curriculum is] all the learning experiences planned and directed by the school to attain its educational goals. (p. 79)

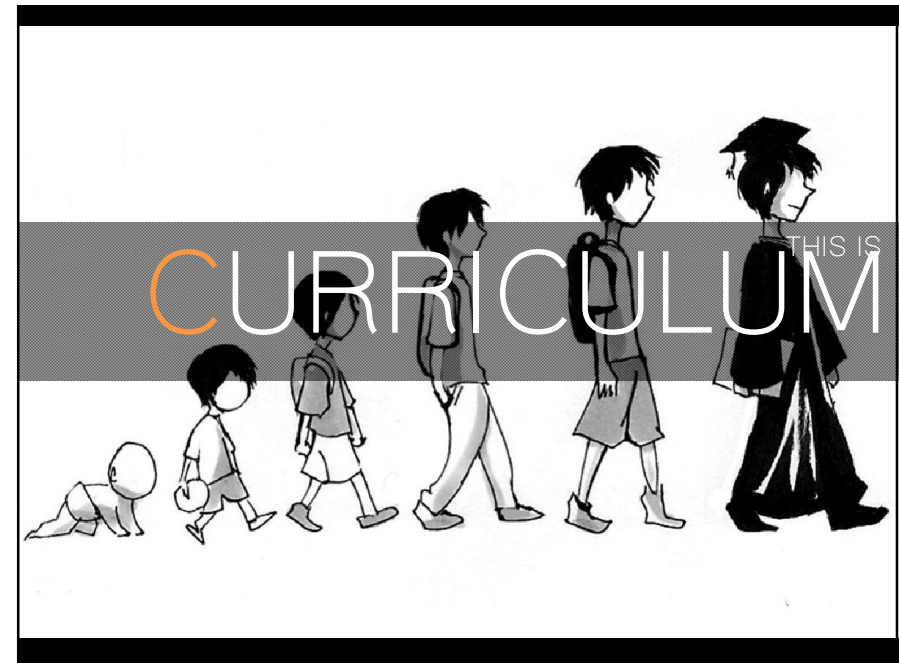
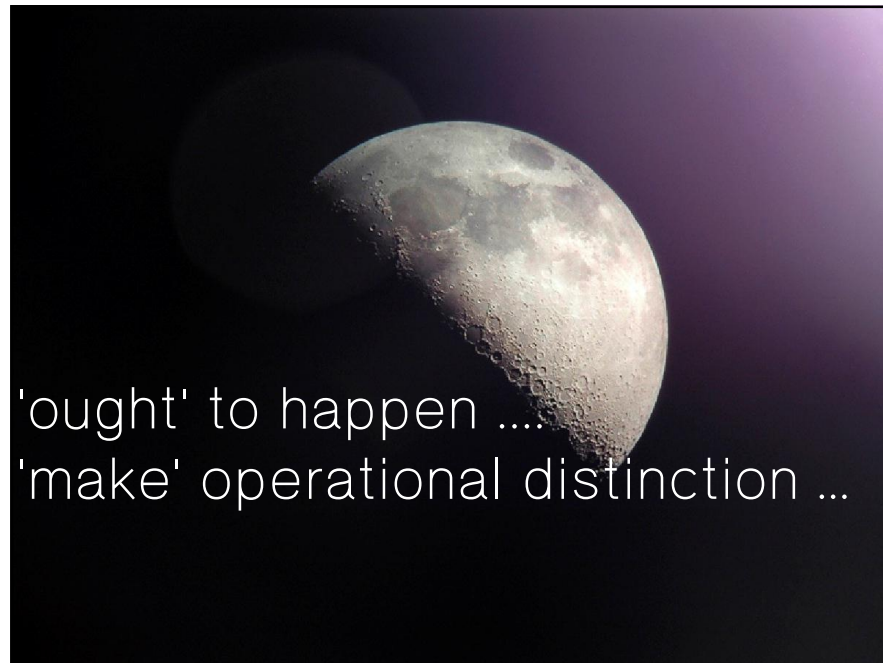
(Continued)


EXHIBIT 1.1 (Continued)


<i>Date</i>	<i>Author</i>	<i>Definition</i>
1967	Robert Gagne	Curriculum is a sequence of content units arranged in such a way that the <u>learning of each unit may be accomplished as a single act</u> , provided the capabilities described by specified prior units (in the sequence) have already been mastered by the learner. (p. 23)
1970	James Popham & Eva Baker	[Curriculum is] all planned learning outcomes for which the school is responsible. . . . Curriculum refers to the desired consequences of instruction. (p. 48)
1997	J. L. McBrien & R. Brandt	[Curriculum] refers to a written plan outlining what students will be taught (a course of study). Curriculum may refer to all the courses offered at a given school, or all the courses offered at a school in a particular area of study.
2010	Indiana Department of Education	Curriculum means the planned interaction of pupils with instructional content, materials, resources, and processes for evaluating the attainment of educational objectives. (n.p.)


EXHIBIT 1.2 Descriptive Definitions of Curriculum


<i>Date</i>	<i>Author</i>	<i>Definition</i>
1935	Hollis Caswell & Doak Campbell	All the experiences children have under the guidance of teachers.
1941	Thomas Hopkins	Those learnings each child selects, accepts, and incorporates into himself to act with, on, and upon, in subsequent experiences.
1960	W. B. Ragan	All experiences of the child for which the school accepts responsibility.
1987	Glen Hass	The set of actual experiences and perceptions of the experiences that each individual learner has of his or her program of education.
1995	Daniel Tanner & Laurel Tanner	The reconstruction of knowledge and experience that enables the learner to grow in exercising intelligent control of subsequent knowledge and experience.
2006	D. F. Brown	All student school experiences relating to the improvement of skills and strategies in thinking critically and creatively, solving problems, working collaboratively with others, communicating well, writing more effectively, reading more analytically, and conducting research to solve problems.
2009	E. Silva	An emphasis on what students can do with knowledge, rather than what units of knowledge they have, is the essence of 21st-century skills.



- 
- the eperiences to which a learner is exposed at school, both inside and outside the classroom

- 
- work and aactivities of a school to meet the learners' needs ...
 - how tteachers are teaching for supporting student

- 
- how should we assess the learning progress of learners
 - graduate profile...

- 
- what learning environment should be ...
 - institutional vision ...
 - etc.

- "That reconstruction of KNOWLEDGE and EXPERIENCE" that ENABLES the learner...

it's learning

outcome
based
curriculum

HOW
to design

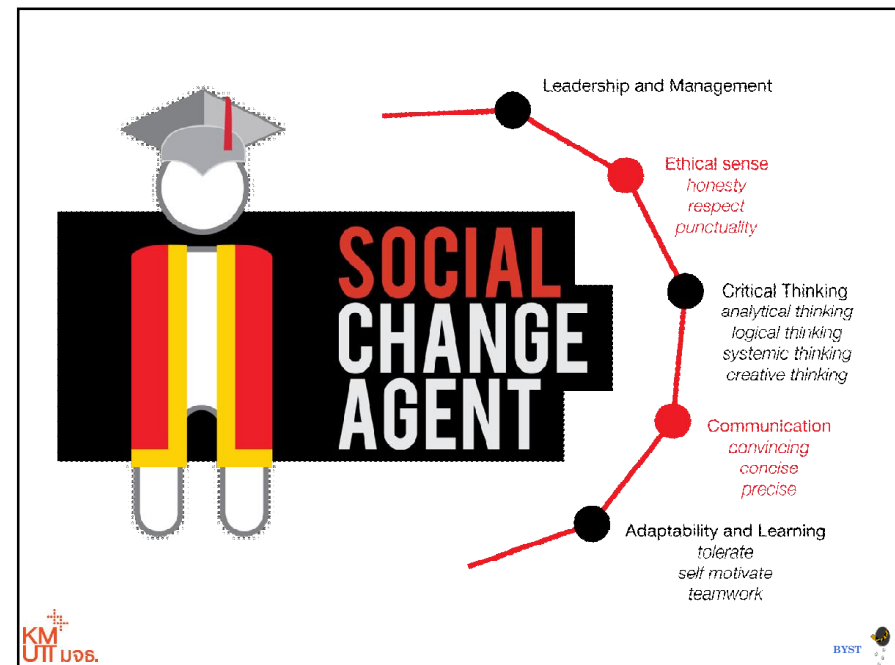
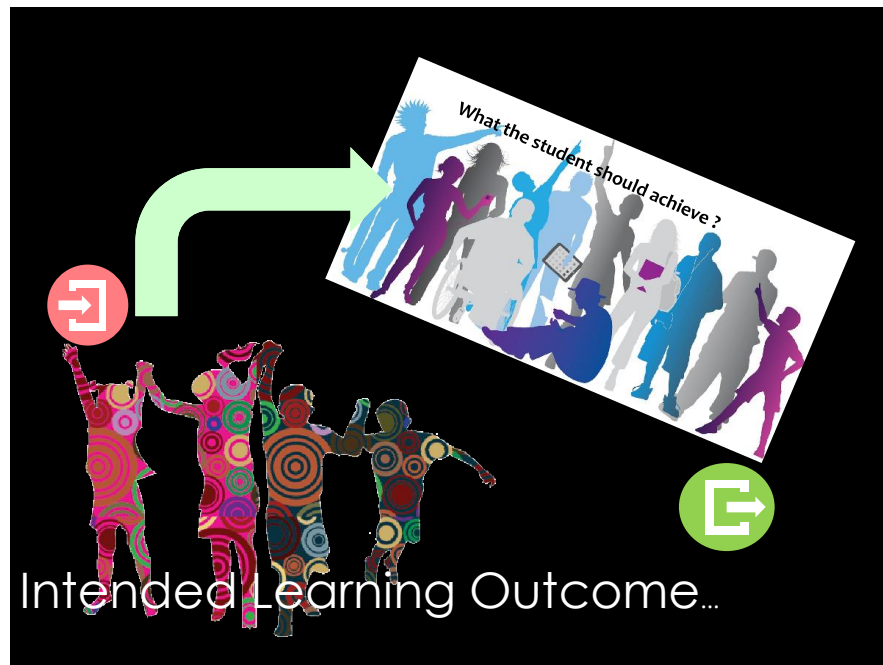
- What is expected from the learning after the students have graduated in order to equip them with the necessary skills and capabilities before they enter the work place.
- Focus on "NEEDS" of Students and Stakeholders.
- Objective and Outcome driven
- Learning outcome is PRE-DETERMINED and INTENTIONAL

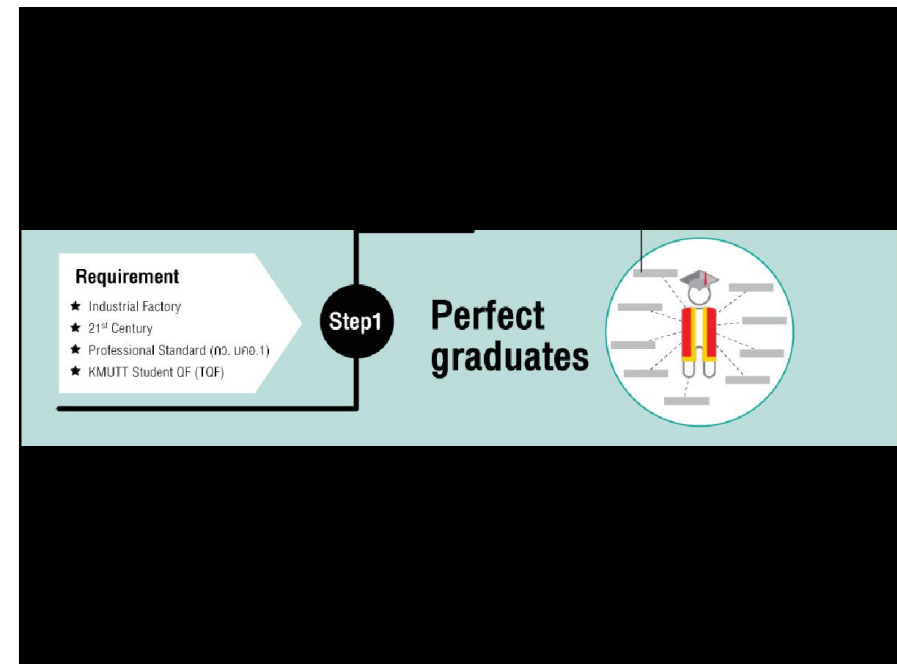
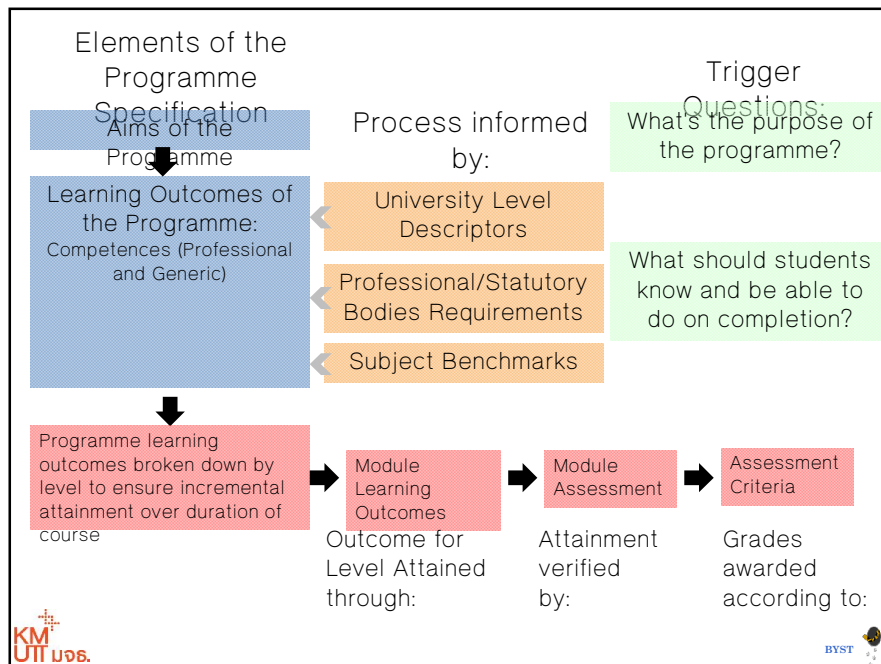
- appropriate assessments methodologies
- delivery modes
- development of instructions
- programme outcomes and course outcomes
- curriculum design

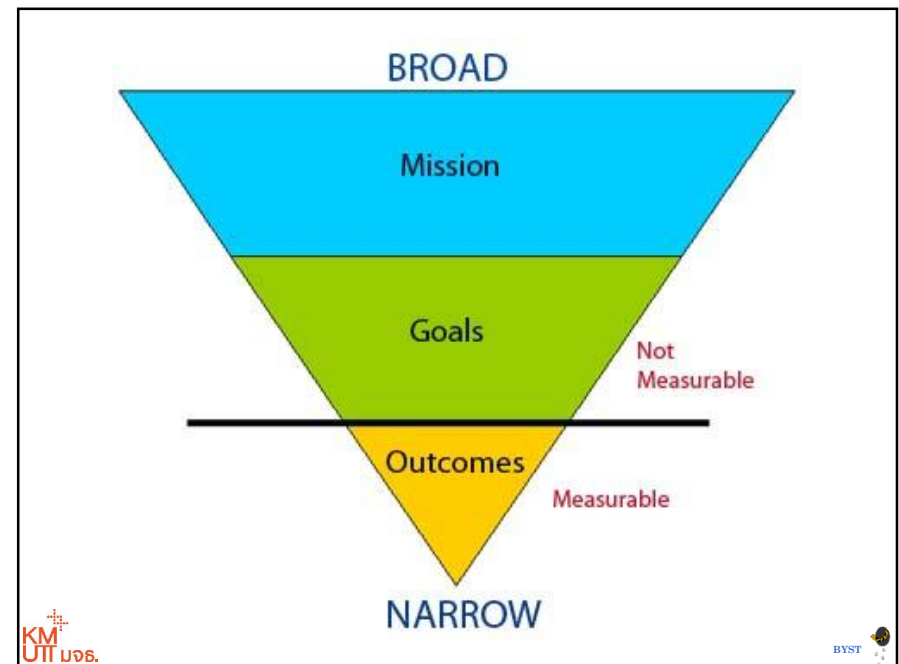
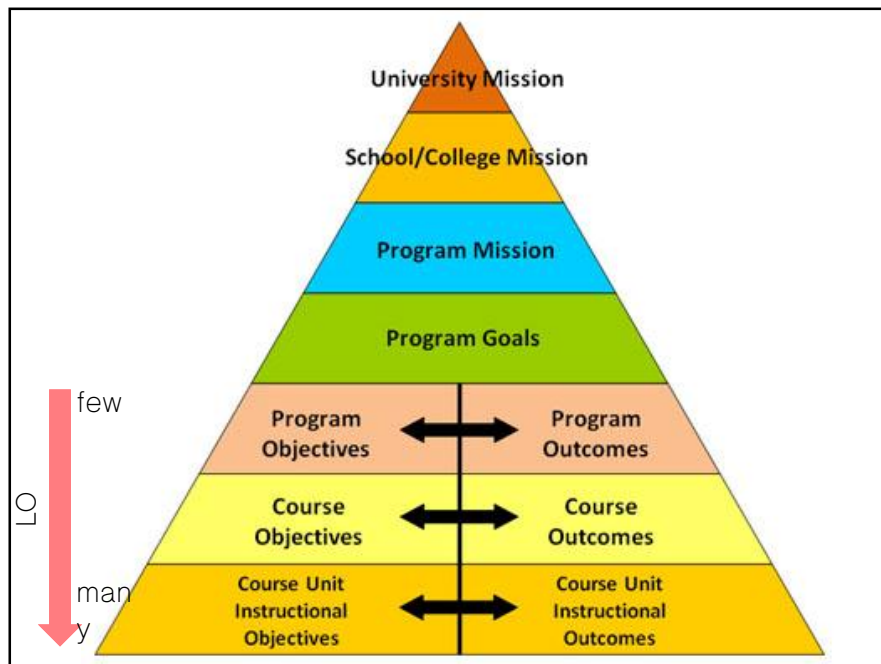
Then go backward with:

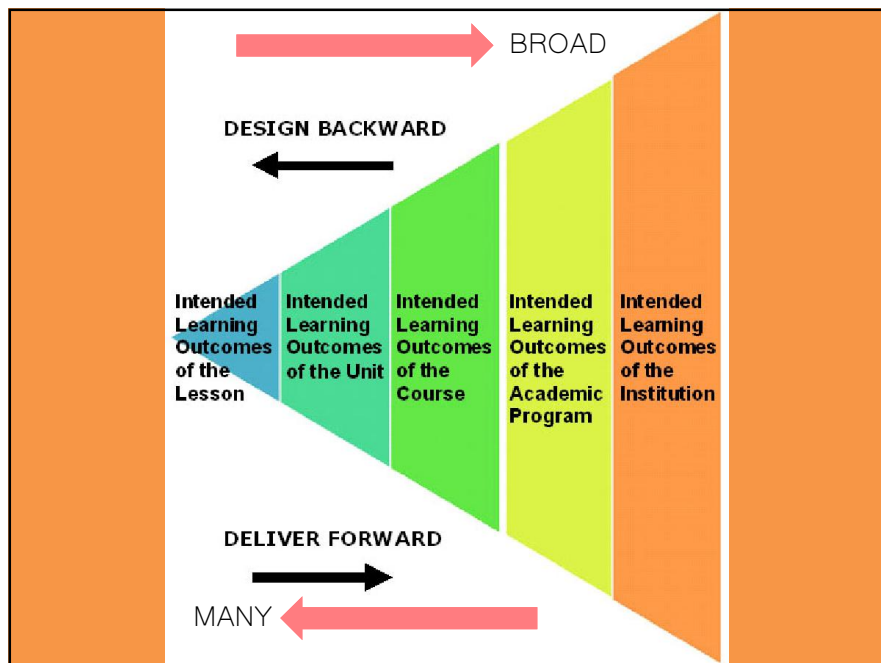
the
right
graduate

what is the
learner
profile







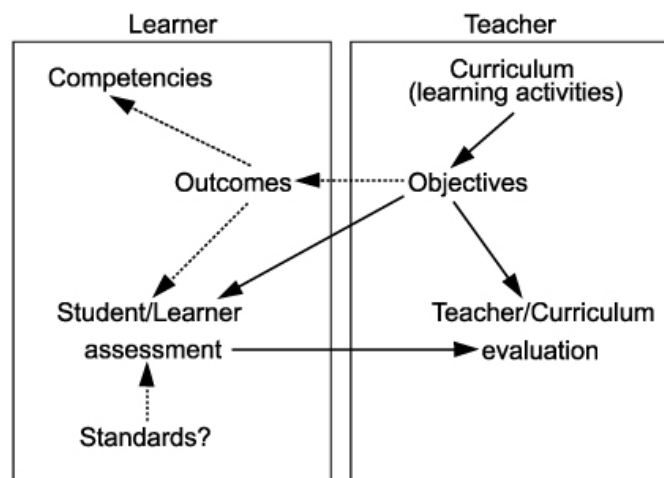


Do

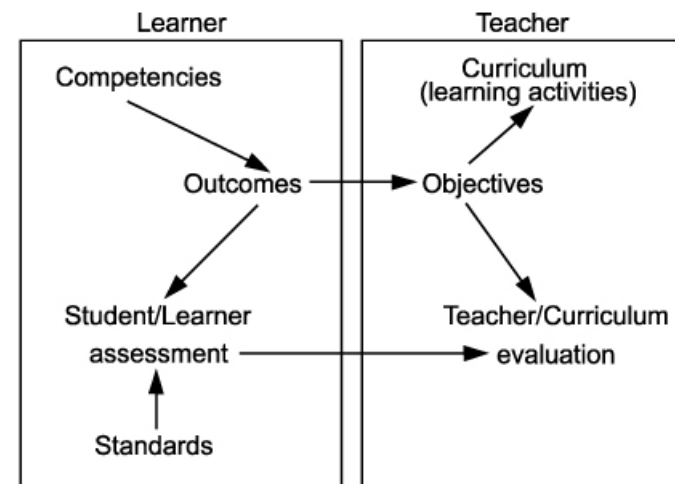
1. Use measurable terms to describe the expected learner actions/ outcomes.
2. Include only ONE measurable outcome in each objective.
3. Write learner-centered objectives that describe what students should know or be able to do as a result of instruction.
4. Ensure that your learning objectives stand alone.
5. When appropriate, be specific when using numbers or describing conditions under which an action will occur.

Don't

1. Don't use vague or immeasurable terms, such as *understand*, *know*, *appreciate*, *become familiar with*, *learn*
2. Combine more than one measurable outcome in a learning objective using "and."
3. Write objectives based on what you, the faculty member, will do to teach the students your content.
4. Write learning objectives that refer to, or rely upon, other learning objectives.
5. Neglect to provide context, or use imprecise words such as *various*, *several*, *a few*, or *multiple*.

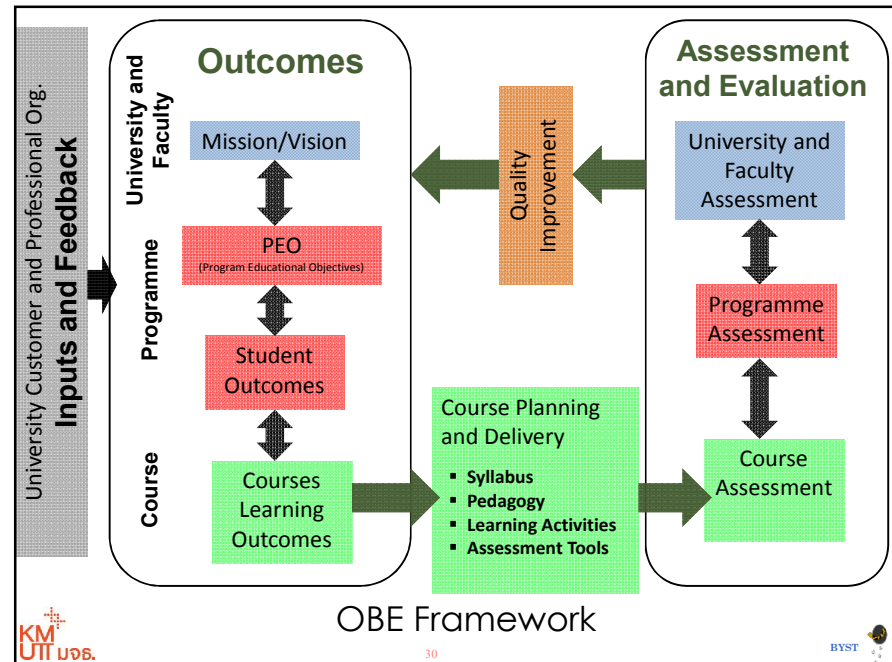
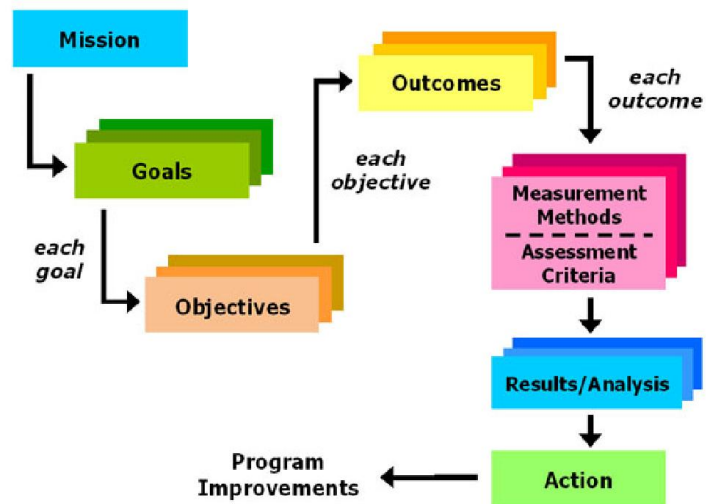


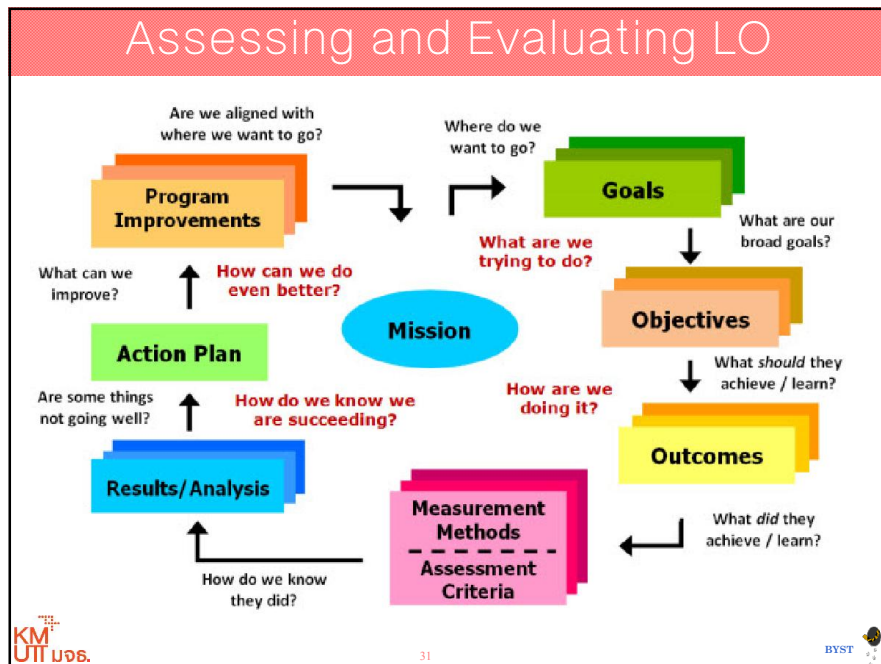
curriculum drives competencies



competencies drive curriculum

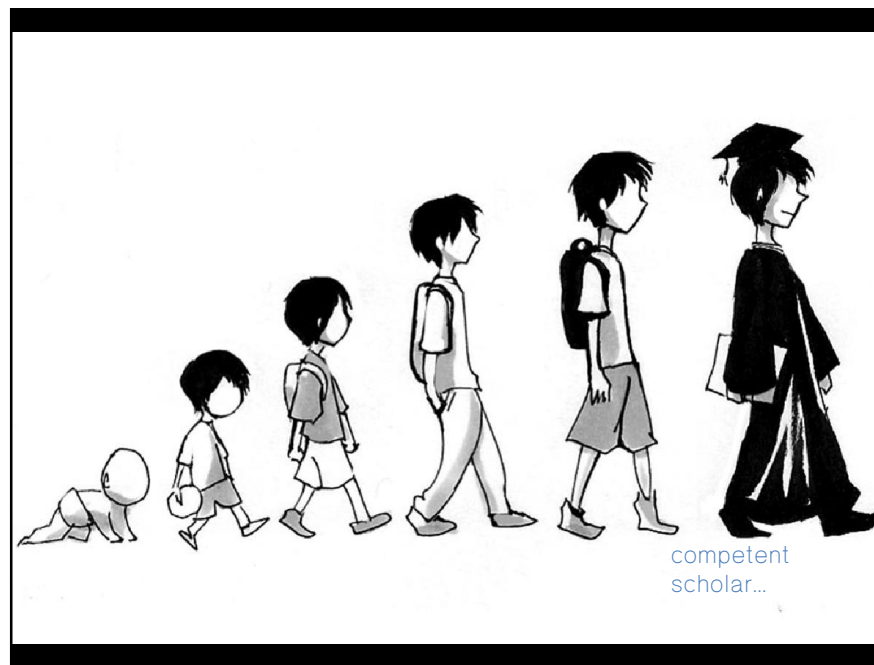
Assessing and Evaluating LO



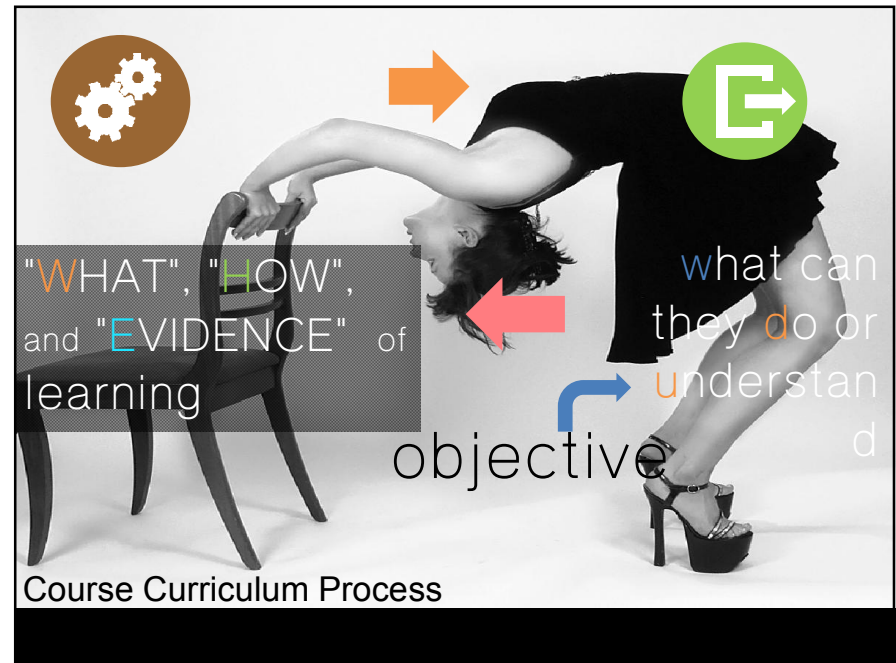




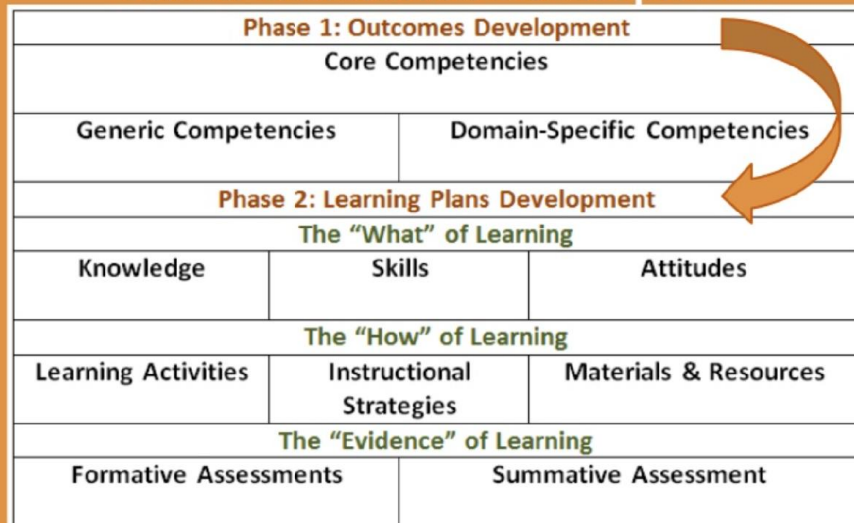
at the **END** of each learning unit what
will student **be** able to do that
they could **not do as**
well before each unit...



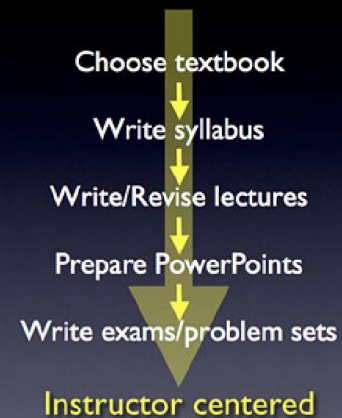
backward
Curriculum
designed ...



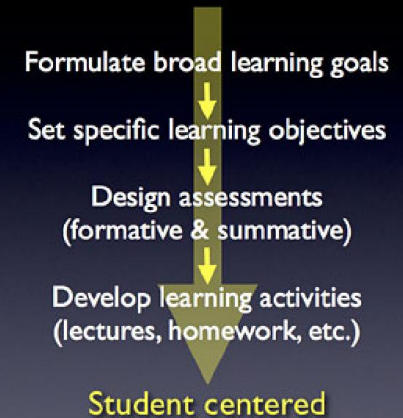
Methodology for Competency-Based Curriculum Development



Standard Course Planning



vs. Backward Design





- what will students learn?
- to what degree will they learn?
- how will they acquire this learning?
- how will they demonstrate this learning?

where great teaching begins; A. R. Reeves

Vision and Mission of MMU

Vision of the University

To be a premier university that propagates the generation and dissemination of knowledge in cutting edge technologies

Mission of the University

1. To deliver quality academic programmes based on state-of-the-art R&D.
2. To attract and nurture quality minds who will contribute towards the global knowledge economy
3. To inculcate a strong research culture within a dynamic, efficient and effective team of academic and support staff
4. To be financially self-sustaining via education and the commercialisation of R&D products and services.

Vision and Mission of FOE

Vision of the Faculty

To be a leading engineering faculty for creation, preservation and dissemination of knowledge, training of knowledge workers for nation building, and providing continuous technical support for the ICT industry in Malaysia.

Mission of the Faculty

1. To produce multi-skilled graduates who are able to spearhead nation-building in the Information Age.
2. To provide opportunities and resources for academic and researchers to carry out the state-of-the-art research and development work.
3. To support the growth of nationwide ICT industry through provision of continuous professional development of knowledge.

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Program Educational Objectives for B.Eng Electronics Majoring in Microwave & Comm.

Programme Educational Objectives (PEO) are **long term goals (5 years or more after graduation)** describing expected achievements of graduates in their career.

PEO of B.Eng. (Hons) Electronics Majoring in Microwave and Communications

- To develop highly competent engineers specialising in the area of microwave and communications technologies in support of the related industry.
- To produce innovative technical leaders that are able to contribute towards the advancement of microwave and communications technologies.

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PEOs and Vision and Mission of MMU and FOE

Example of how PEOs are linked to the Vision and Mission

Vision of the Faculty	Mission of the Faculty	Programme Educational Objectives (PEOs)
To be a leading engineering faculty for creation, preservation and dissemination of knowledge, training of knowledge workers for nation building, and providing continuous technical support for the ICT industry in Malaysia	<ol style="list-style-type: none"> 1. To produce multi-skilled graduates who are able to spearhead nation-building in the Information Age 2. To provide opportunities and resources for academic and researchers to carry out the state-of-the-art research and development work 3. To support the growth of nationwide ICT industry through provision of continuous professional development of knowledge 	<ol style="list-style-type: none"> 1. To develop highly competent engineers specialising in the area of microwave and communications technologies in support of the related industry. -Related to M1, M2 & M3 2. To produce innovative technical leaders that are able to contribute towards the advancement of microwave and communications technologies. -Related to M1 & M3

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Program Outcomes for B.Eng Electronics Majoring in Microwave & Comm.

Programme Outcomes (PO) are **short term outcomes (at the point of graduation)** describing what students are expected to know and be able to perform.

POs of B.Eng. (Hons) Electronics Majoring in Microwave and Communications

2. Ability to acquire and apply fundamental principles of science and engineering.
3. Capability to communicate effectively.
4. Acquisition of technical competence in specialized areas of engineering discipline.
5. Ability to identify, formulate and model problems and find engineering solutions based on a systems approach.
6. Ability to conduct investigation and research on engineering problems in a chosen field of study.

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Program Outcomes for B.Eng Electronics Majoring in Microwave & Comm.

POs Cont...

2. Understanding of the importance of sustainability and cost-effectiveness in design and development of engineering solutions.
3. Understanding and commitment to professional and ethical responsibilities.
4. Ability to work effectively as an individual, and as a member/leader in a team.
5. Ability to be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurial skills.
6. Awareness of the social, cultural, global and environmental responsibilities as an engineer.
7. Capability and enthusiasm for self-improvement through continuous professional development and life-long learning.

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Outcome-Based Education

Example of how POs are linked to the PEOs

Programme Educational Objectives (PEOs)	Description of how POs (Programme Outcomes) are linked to the PEOs
1. To produce all-rounded engineers in the telecommunications technologies in support of the emerging ICT industry 2. To develop capable technical leaders who are able to spearhead the advancement of telecommunications in the country.	1. Ability to acquire and apply fundamental principles of science and engineering. - <i>The graduates have firm fundamental knowledge and therefore can easily understand and adapt to any change in the technology</i> - <i>This will ensure that the graduates will be of high caliber equipped with the fundamental technical principles of science and engineering so that they can lead, facilitate and support the development of engineering practices in the industries in Malaysia</i> - <i>Related to PEO 1</i>
	2. Capability to communicate effectively - <i>Communication and networking skills are enhanced through presentations, exchanging ideas and arguing with solid rational</i> - <i>To be a good leader, effective communication is a must</i> - <i>Related to PEOs 1 and 2</i>

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Outcome-Based Education

Example of how the course subjects contribute towards POs

Programme Outcome	Descriptions
Ability to acquire and apply fundamental principles of science and engineering	<ul style="list-style-type: none"> - Core subjects on Mathematics (Engineering Mathematics I to IV), Circuit Theory, Electronics (I to III), Computer & Program Design, Field Theory, Digital Logic Design, Instrumentation & Measurement Techniques, Introduction to Machines, Algorithm & Data Structure, Microprocessor Systems & Interfacing, Circuits and Signals, Electromagnetic Theory, Control Theory, Communication Networks, Electromagnetic Interference, Introduction to Power Systems. - Basic concepts and theories and their relation to actual engineering systems are applied and extended in Final Year Projects and Industrial Training. - Extensive laboratory experiments to provide in-depth practical knowledge and hands-on experience to students.

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Outcome-Based Education

Learning Outcomes (LO) of subjects are statements of a learning achievement on completion of the subject.

LOs of EEN1036 Digital Logic Design:

2. Describe the differences between analog and digital systems, and their respective advantages and disadvantages.
3. Apply positional notations, number systems and computer codes in digital systems.
4. Apply algebraic methods based on Boolean algebra and truth table to analyse logic circuits.
5. Apply minimisation methods such as Karnaugh maps and Quine-McCluskey tabular method to simplify switching functions.
6. Apply the concepts of sequential logic and memory devices in digital systems.
7. Design modular combinational circuits using encoders, decoders, multiplexers and demultiplexers.

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Outcome-Based Education

Course to Program Outcomes Matrix for Courses under the **Electronic Engineering Majoring in Microwave and Communications**

CODE	SUBJECT	CONTRIBUTION TO PROGRAMME OUTCOMES (PO)										
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
ENGINEERING SUBJECTS												
EEM1016	Engineering Mathematics I	80	10	0	10	0	0	0	0	0	0	0
EEM1026	Engineering Mathematics II	80	10	0	10	0	0	0	0	0	0	0
EEM2036	Engineering Mathematics III	80	10	0	10	0	0	0	0	0	0	0
EEM2046	Engineering Mathematics IV	80	10	0	10	0	0	0	0	0	0	0
EEM3066	Random Processes and Queueing Theory	0	5	45	45	0	0	0	5	0	0	0
ECT1016	Circuit Theory	60	10	10	10	0	0	0	10	0	0	0
ECT1026	Field Theory	60	10	10	10	0	0	0	10	0	0	0
ECT2036	Circuits and Signals	50	10	10	10	0	10	0	10	0	0	0
EEN1016	Electronics I	60	10	10	5	0	10	0	5	0	0	0
EEN1036	Digital Logic Design	50	10	10	15	0	5	0	10	0	0	0
EEN1046	Electronics II	50	10	10	10	0	10	0	10	0	0	0
EEN3096	Communications Electronics	30	10	25	15	10	0	0	10	0	0	0
ECP1016	Computer and Program Design	10	10	10	20	0	20	0	10	0	0	20
ECP1026	Algorithm and Data Structure	40	5	15	10	10	10	5	0	0	0	5

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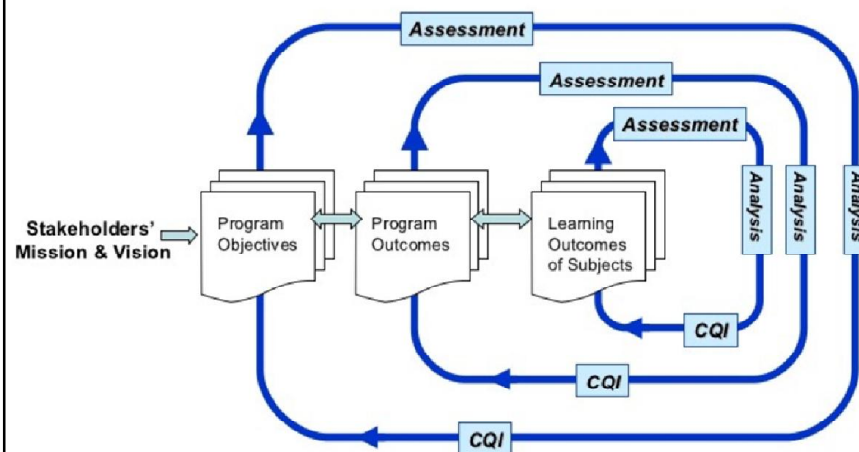
Outcome-Based Education

Example of Assessment Methods for Program Outcome 2: Capability to Communicate Effectively

Performance Criteria	Subjects	Assessment Methods	Documents to be Kept
<ul style="list-style-type: none"> Present and document ideas and experimental results properly documented in a specified format, and supported with evidence. The document must contain explanation with sufficient detail, with minimum grammatical and spelling errors. 	<ul style="list-style-type: none"> All Subjects- Lab Experiments, FYP, ITP, Mini Projects 	<ul style="list-style-type: none"> Coursework and exam presentation of Final Year Project and Industrial Training reports Lab Reports 	<ul style="list-style-type: none"> Exam scripts and assignment Final Year Project and Industrial Training reports and mark sheets, lab reports,
<ul style="list-style-type: none"> Use multimedia content in oral and visual communication 	<ul style="list-style-type: none"> EPT4046 Final Year Project, EPT4066 Industrial Training Mini Project Other Seminars, and Meetings 	<ul style="list-style-type: none"> Presentation of Final Year Project, Industrial Training, Mini projects and other seminars 	<ul style="list-style-type: none"> Final Year Project and Industrial Training, Mini Projects mark sheets, PowerPoint presentation slides. Attendance records in other seminars
<ul style="list-style-type: none"> Respond to audience's questions correctly and confidently 	<ul style="list-style-type: none"> EPT4046 Final Year Project, EPT4066 Industrial Training, EPT3016 Mini Project, other seminars and meetings 	<ul style="list-style-type: none"> Presentation of Final Year Project, Industrial Training, Mini projects and other seminars 	<ul style="list-style-type: none"> Final Year Project and Industrial Training, Mini Projects mark sheets, PowerPoint presentation slides. Student attendance records in other seminars

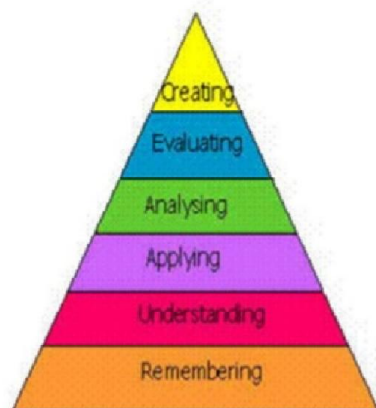
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Outcome-Based Education



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Effective Outcomes are “mApped”: Appropriate



- Level 3. **Problem-Solving** – Evaluating and Creating
- Level 2. **Interpretation** – Applying and Analyzing
- Level 1. **Recall** – Remembering and Understanding

Examples

- On all written assignments and exams, students will use correct grammar and spelling.
- Students will walk the entire length of a balance beam set to standard height without falling off within a 15 second time frame.
- Students will correctly write and balance chemistry equations using chemical equations.

What does an “ideal” graduate of your program look like? In a perfect world, how will your graduates think and behave? What “tools” – theories, concepts and techniques – will they be able to apply?

Our graduates will:

1. have the knowledge required to be successful in their field.
2. have the skills needed to be able to function successfully in their field.
3. be able to analyze problems in their field and develop solutions or strategies to solve those problems.
4. be able to communicate effectively.
5. be able to apply the discipline’s code of ethics when making decisions.
6. be able to design an experiment and analyze data.

Components of Program Learning Outcomes

Program learning outcomes are typically quite broadly written to keep the number of outcomes to a manageable number. The broad outcome can be further defined by considering the components required to achieve the outcome. For example, most would agree that the “communicate effectively” outcome would include at least the following components:

- Ability to organize a presentation in a coherent fashion.
- Ability to research a topic.
- Ability to create a persuasive argument.
- Ability to write grammatically correct sentences and paragraphs.

how to assess the
accomplishment
of learners ...

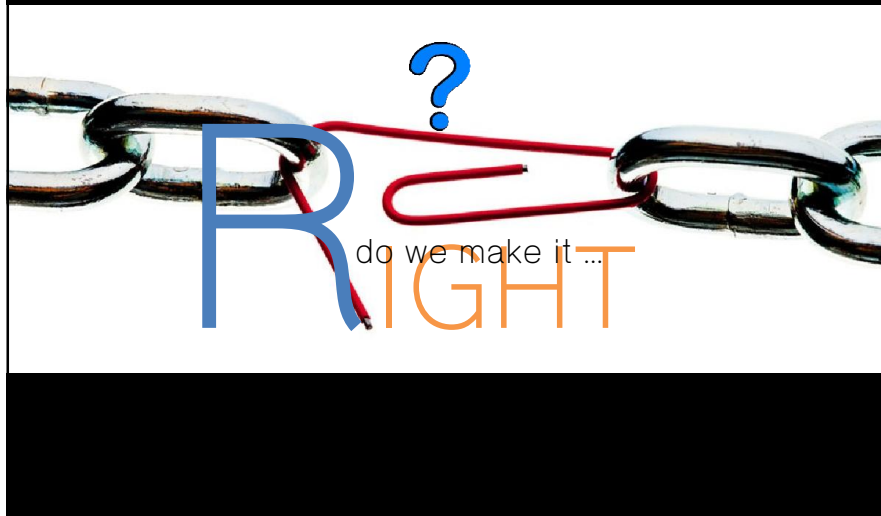
LEARNING OUTCOME

validation ...

do we deliver the RIGHT
GRADUATES



verification ...



assessment

is the process of
gathering the data....

Summative Assessments	Formative Assessments	Direct Assessments	Indirect Assessments
<ul style="list-style-type: none"> •Assessment of knowledge after learning has ended •Often done just prior to graduation •Often norm-referenced or criterion-referenced 	<ul style="list-style-type: none"> •Assessment of student learning at any point during the learning process •Goal is to help students learn better •Provides criteria on which to improve 	<ul style="list-style-type: none"> •Examine samples of student work •Can be exam questions, student papers or presentations, student portfolios, standardized exams or licensure exams 	<ul style="list-style-type: none"> •Indicators of learning other than student work output •Obtain feedback from the student or other persons who can provide relevant information •Can be employer surveys, exit interviews of graduates, focus groups, etc.



