Awareness on Outcome-Based Education (OBE) and Preparation for EAC BEM Accreditation

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2014
OUTCOMES OF THIS TALK

At the end of this talk, students should be:

- **Aware of the coming EAC visit**
- **Aware of the OBE implementation in class**
  - How important OBE is to the programme (PEO, PO and CO)
  - Delivery of course contents
  - Assessment methods/tools/criteria (rubrics) used by lecturers
- **Better prepared if selected to be interviewed by EAC panels**
CONTENTS OF THIS TALK

• Who and what is EAC
• 5Ws and 1H of OBE
• What and How is OBE implemented in your class
• FAQs and questionnaires
WHO, WHAT, WHY OF EAC

• Who is EAC? (pg 1)
• What does EAC do?
• Why does EAC want to come to UTM?
  ➢ Accreditation (pg 1)
  ➢ The EAC Manual 2012 & requirements (8Q & 5C)
  ➢ Conditions for full or 5-year accreditation
    • Level of education
    • Full OBE implementation
    • CQI made evident
• Presence of Mentors/Reviewers from WA
What is EAC for?

Towards international recognition of graduates

YOUR PROGRAMME are recognised globally and YOU can secure jobs anywhere in the world
ANNOUNCEMENT!!!

RE: EAC Accreditation Visit
Date: 19-20 Feb 2014
Venue: UTM
Please be ready to be interviewed.
YOU maybe one of them
'5 Ws and 1 H OF OBE

• What
• Who
• Where
• When
• Why
  ➢ Requirement of the EAC Manual 2012 (page 10)
  ➢ 3 conditions for full or 5-year accreditation
    – Level of education
    – Full OBE implementation
    – CQI made evident

• HOW
The new Programme Outcomes
Based on EAC Manual 2012

I. **Engineering Knowledge** - Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problems.

ii. **Problem Analysis** - Identify, formulate, research literature and analyse complex engineering problems teaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

iii. **Design/Development of Solutions** - Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

iv. **Investigation** - Conduct investigation into complex problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

v. **Modern Tool Usage** - Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations.

vi. **The Engineer and Society** - Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
vii. **Environment and Sustainability** - Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development

viii. **Ethics** - Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice

ix. **Communication** - Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

x. **Individual and Team Work** – Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings

xi. **Life-long Learning** - Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

xii. **Project Management and Finance** - Demonstrate knowledge and understanding of engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments
What is Outcome-Based Education?
How Important is OBE

OBE

Monitors your performance TODAY to project your competency as Civil Engineers of TOMORROW through CQI
OBE is a REQUIREMENT of

- Ministry of Education, Malaysia
- Malaysian Qualifications Framework (MQA & MQF)
- Board of Engineers (BEM)
OBE focuses on student learning by:

• Using learning outcome statements to make explicit what the student is expected to be able to know, understand or do;

• Providing learning activities which will help the student to reach these outcomes;

• Assessing the extent to which the student meets these outcomes through the use of explicit assessment criteria.
The Concept Of Outcome-Based Education (OBE)
Figure 1: Elements of course design
What are Programme Outcomes?

statement of what a learner is expected to know, understand and/or be able to do at the end of a period of programme
Some Immediate Advantages

- Always alert on quality of graduates
- More effective & innovative teaching
  - PBL, CL, etc
- More industrial input
• The graduate outcomes for a degree are clearly written statements about the knowledge, skills and attitudes of its graduates.

• Graduate outcomes are developed from a number of sources including professional accreditation bodies, employer groups, the university educational principles and the professional experience of staff teaching in the discipline.
## Differences between Content-Based Education and OBE

<table>
<thead>
<tr>
<th>PROCESS STEP</th>
<th>Contents-based Education</th>
<th>Outcomes-based Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needs analysis</td>
<td>A very few parties are consulted before trainers develop courses themselves. Trainers decide on how needs are determined and expressed.</td>
<td>All stakeholders are consulted prior to curriculum development: employers, employees, government, special interest groups, providers and learners. The end-product of needs analysis is reflected as unit standards.</td>
</tr>
<tr>
<td>Course design</td>
<td>Instructional designers develop courses around the contents. The outcomes of a course are written as objectives.</td>
<td>Learning programmes are designed according to the needs of the above six stakeholders. Outcomes clearly indicate what the learner must be able to do in line with national standards.</td>
</tr>
</tbody>
</table>
### Differences between Contents-Based Education and OBE

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<thead>
<tr>
<th>PROCESS STEP</th>
<th>Contents-based Education</th>
<th>Outcomes-based Education</th>
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</thead>
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<tr>
<td>Learning material</td>
<td>The learning material is called study manuals or textbooks which is contents-driven. The instructor determines the content. The content is mainly theoretical.</td>
<td>Learning material is called learning guides and is outcomes-driven. The contents are determined by the inputs of various role-players. The contents are practical, addressing particular skills.</td>
</tr>
<tr>
<td>Presentation</td>
<td>The instructor presents a pre-determined lesson. The instructor is in control of the learning event.</td>
<td>A facilitator presents a lesson based on the unit standard in a flexible manner. The facilitator guides learners to achieve outcomes.</td>
</tr>
<tr>
<td>Assessment</td>
<td>Learners do assignments and write tests and examinations in order to indicate their level of competence. Assessment criteria are non-existent or vague.</td>
<td>A variety of assessment techniques are used, for example simulations, portfolios, self assessment, workplace assessment. Assessment criteria are clearly defined and indicated as part of the unit standard.</td>
</tr>
</tbody>
</table>
• What and How of OBE implementation in your class
  – Our Programme Specification (PEO, PO, CO)
  – Delivery of course contents (Course Outlines)
  – Assessment methods/tools/criteria used by lecturers
    • PO1 to PO3
    • PO4 to PO10 (rubrics)
FAQs and Questionnaire
Reminder!

Students should alert to these items

- Actively participate in e-Learning
- Fill e-PPP On-Line Form
- Alert and Prepare for Exit Test
- Aware and Struggle to obtain all the POs
- Participate in Holistic Student Development Program
- **GET READY FOR ACCREDITATION IN FEB 2014**
  - (for approval of your program – Bachelor of Engineering (Civil/Electrical/Mechanical/Chemical)
Examples of Q&A During Accreditation of EAC-BEM

- What do you understand about OBE?
- How your lecturers do the assessment?
- Are you feel comfortable with the Final Year Project (PSM)?
- Have you made a preliminary study before you conduct your research project?
- Do you refer to any books, journals, proceeding etc in your study?
- What are the softwares that you use for your project?
- What do you think about the internet service? Is it sufficient or not?
- How frequent you go to the library?
- How do you improve the learning process?
- What is the maximum credit allowed to take by a student?
- What is the challenging work in your project?
- What are the courses which address complex problems?
UTM NEEDS YOUR PARTICIPATION AND SUPPORT

GOOD LUCK
• Aware of the coming EAC visit
• Aware of the OBE implementation in class
  – How important OBE is to the programme (PEO, PO, CO)
  – Delivery of course contents
  – Assessment methods/tools/criteria (rubrics) used by lecturers
• Better prepared if selected to be interviewed by EAC panels
Your Preferred Partner In Lifelong Learning

Terima Kasih

Memperkasa Pembelajaran Sepanjang Hayat

Sekolah Pendidikan Profesional Dan Pendidikan Berterusan
<table>
<thead>
<tr>
<th>PEO</th>
<th>Description</th>
<th>Mapped to EAC-BEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO 1</td>
<td>Graduates are <strong>competent, innovative and entrepreneurial</strong> in acquiring and applying knowledge towards solving complex civil engineering problems.</td>
<td>i, ii, iii, iv, v</td>
</tr>
<tr>
<td>PEO 2</td>
<td>Graduates possess <strong>leadership</strong> qualities, able to work, manage in <strong>diverse teams</strong> and serve the <strong>society</strong> in multi disciplinary environment.</td>
<td>vi, x, xii</td>
</tr>
<tr>
<td>PEO 3</td>
<td>Graduates demonstrate <strong>professionalism</strong> and uphold <strong>ethical values</strong> with emphasis on <strong>sustainable environment</strong></td>
<td>vii, viii</td>
</tr>
<tr>
<td>PEO 4</td>
<td>Graduates are able to <strong>communicate</strong> effectively, possess strong self <strong>confidence</strong> and recognise the need for <strong>life-long learning</strong></td>
<td>ix, xi</td>
</tr>
<tr>
<td>PO</td>
<td>Description</td>
<td>Mapped to EAC-BEM</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
</tbody>
</table>
| PO 1 | Ability to apply knowledge of science, mathematics, civil engineering principles and other relevant field of studies to solve complex engineering problems | I  
      |                                                      | Basic Knowledge                       |
| PO 2 | Ability to analyse and use appropriate techniques, resources and modern tools to solve complex engineering problems and activities | ii, v  
      |                                                      | Analysis  
      |                                                      | Modern Tool |
| PO 3 | Ability to design solutions for complex problems and design components, systems, or processes that comply specific requirement with appropriate consideration of other requirements. | iii  
      |                                                      | Design                                     |
| PO 4 | Ability to resolve complex problems based on investigation or research using integration of knowledge and the consequent responsibilities relevant to professional practice. | iv, vi  
      |                                                      | Problem Solving                           |
| PO 5 | Ability to communicate effectively and with confidence including complex engineering activities.       | ix  
      |                                                      | Communication                             |
Characteristics of Complex Problems (CP)

Engineering problems which cannot be resolved without in-depth engineering knowledge - EAC

CP 1: Include any conflicting technical, engineering or other issues
CP 2: Depth of analysis required (have no obvious solution and require abstract thinking)
CP 3: Depth of knowledge (require research-based knowledge)
CP 4: Include unfamiliar issues
CP 5: Use other codes (other than BS or EC)
CP 6: Extent of stakeholder involvement (in lecture)
CP 7: Consequences (effects to the global/ social)
CP 8: Interdependence (relation to other fields)
Characteristics of Complex Problems (CP)

(taken from our External Examiner – Prof. Roger Plank)

- No single specific answer
- There is no prescribed process for arriving at a solution
- Not directly related to procedures and problems presented formally (eg through lectures)
- Requiring some judgement, for example about what approaches to adopt
- Possibly involving more than one discipline or subject area (eg hydraulics and geotechnics)
- Requiring students to make qualitative decisions, and to provide reasoned justification for these
Eng problems which cannot be resolved without in-depth engineering knowledge (use Taxonomy Levels)

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Complex Problems</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of conflicting</td>
<td>Involve wide-ranging or conflicting technical, engineering and other issues.</td>
<td>Course that contains interdisciplinary field</td>
</tr>
<tr>
<td>conflicting requirements</td>
<td>(include structured controversies in engineering)</td>
<td>• Construction and project Management</td>
</tr>
<tr>
<td>CP 1</td>
<td></td>
<td>• PAP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Construction plant and equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Geotechnic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PSM (eg: rain water harvesting – hydrology, environment, structure)</td>
</tr>
</tbody>
</table>
Complex Activities (CA)

Complex activities means activities or projects that have some or all of the following characteristics (generally design project)

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Complex Problems</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA 1</td>
<td>Range of resources</td>
<td>Involve the use of diverse resources (and for this purpose, resources include people, money, equipment, materials, information and technologies).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Modern tools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Web</td>
</tr>
<tr>
<td>CA 2</td>
<td>Level of interaction</td>
<td>Require resolution of significant problems arising from interactions between wide ranging or conflicting technical, engineering or other issues.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carry out interaction and integration of activities pertaining to engineering / technical / environmental / social / management to solve problem</td>
</tr>
</tbody>
</table>
Knowledge Profiles (KP)

It refers to curriculum. To ensure continuity and comprehensiveness, not only in the deliverance of the course but also between courses. Hence, lecturers are strongly encouraged to include as much as possible the KPs in their T&L.

<table>
<thead>
<tr>
<th>Complex Activities</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
</table>
| **KP 1** A systematic, theory-based understanding of the natural sciences applicable to the discipline (e.g. calculus-based physics) | Understanding basic principles of natural sciences                          | • Conservation of energy  
• Newton Laws  
• Seepage Equation |
| **KP 2** Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline | Application of mathematic in engineering                                     | • Laplace, Fourier, Taylor series  
• Numerical analysis  
• Probablistic analysis  
• Computer and information sciences  
• Lumped and Distributed Hidrologic Modelling  
• Seepage  
• Mohr’s circle |
<table>
<thead>
<tr>
<th>No.</th>
<th>Course Outcomes</th>
<th>Program Outcome</th>
<th>Complex Problems</th>
<th>Complex Activities</th>
<th>Knowledge Profile</th>
<th>Bloom’s Taxonomy</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO 1</td>
<td>State the significance of Structural Analysis in the Civil Engineering context.</td>
<td>PO 2</td>
<td></td>
<td></td>
<td>KP 2</td>
<td>L1</td>
<td>Assign Ment</td>
</tr>
<tr>
<td>CO 2</td>
<td>Analyse beams, frames and trusses using the Flexibility Method and Stiffness Method. Comprehend an overview of Finite Element analysis.</td>
<td>PO 2</td>
<td></td>
<td></td>
<td>KP 3</td>
<td>L4</td>
<td>Test 1 Exam</td>
</tr>
<tr>
<td>CO 3</td>
<td>Use existing analysis software for analysing structures</td>
<td>PO 2</td>
<td>CP 2</td>
<td>CA 1</td>
<td></td>
<td>L5</td>
<td>Test 2 Project</td>
</tr>
<tr>
<td>CO 4</td>
<td>Students should attend a minimum of 80% of the lectures. The students should aware on the currents situation in FKA</td>
<td>PO 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Attendance and awareness test</td>
</tr>
</tbody>
</table>
Bloom’s Taxonomy (for Cognitive Domain)

<table>
<thead>
<tr>
<th>NEW</th>
</tr>
</thead>
</table>
| 1   | Remembering (ask student to recall)  
- list |
| 2   | Understanding (ask student to explain)  
- explain |
| 3   | Applying (ask student to use the info.)  
- calculate, solve, determine |
| 4   | Analyzing (ask student to distinguish)  
- classify, predict, derived |
| 5   | Evaluating (ask student to argue)  
- design, improve |
| 6   | Creating (ask student to create new things)  
- judge, select, critique |

Each course should include the highest level of Bloom’s Taxonomy.
# Psychomotor Domain

*doing, skills*

<table>
<thead>
<tr>
<th>Perception</th>
<th>Set</th>
<th>Guided Response</th>
<th>Complete Overt Response</th>
<th>Mechanism</th>
<th>Adaption</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition:</strong></td>
<td><strong>Definition:</strong></td>
<td><strong>Definition:</strong></td>
<td><strong>Definition:</strong></td>
<td><strong>Definition:</strong></td>
<td><strong>Definition:</strong></td>
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<tr>
<td>Sample Verbs:</td>
<td>Sample Verbs:</td>
<td>Sample Verbs:</td>
<td>Sample Verbs:</td>
<td>Sample Verbs:</td>
<td>Sample Verbs:</td>
<td>Sample Verbs:</td>
</tr>
<tr>
<td>• detect</td>
<td>• achieve a posture</td>
<td>• copy</td>
<td>• act habitually</td>
<td>• designs</td>
<td>• adapts</td>
<td></td>
</tr>
<tr>
<td>• hear</td>
<td>• assume a body stance</td>
<td>• duplicate</td>
<td>• advance with assurance</td>
<td>• originates</td>
<td>• reorganizes</td>
<td></td>
</tr>
<tr>
<td>• listen</td>
<td>• establish a body position</td>
<td>• imitate</td>
<td>• control</td>
<td>• combines</td>
<td>• analyzes</td>
<td></td>
</tr>
<tr>
<td>• observe</td>
<td>• place hands, arms, etc.</td>
<td>• manipulate with guidance</td>
<td>• direct</td>
<td>• composes</td>
<td>• revises</td>
<td></td>
</tr>
<tr>
<td>• perceive</td>
<td>• position the body</td>
<td>• operate under supervision</td>
<td>• excel</td>
<td>• constructs</td>
<td>• changes</td>
<td></td>
</tr>
<tr>
<td>• recognize</td>
<td>• sit</td>
<td>• practice</td>
<td>• guide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• see</td>
<td>• stand</td>
<td>• repeat</td>
<td>• maintain efficiency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• sense</td>
<td>• station</td>
<td>• try</td>
<td>• manage</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• smell</td>
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<td></td>
<td>• master</td>
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<tr>
<td>• taste</td>
<td></td>
<td></td>
<td>• organize</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• view</td>
<td></td>
<td></td>
<td>• perfect</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• watch</td>
<td></td>
<td></td>
<td>• perform</td>
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</tbody>
</table>

**lower order**  |  |  |  |  |  |  |
**Intermediate** |  |  |  |  |  |  |
**Higher order** |  |  |  |  |  |  |
Affective Domain

(feeling, attitudes)

**Receiving**

**Definition:**
Selectively attends to stimuli.

**Sample Verbs:**
- accept
- acknowledge
- be aware
- listen
- notice
- pay attention
- tolerate

**Responding**

**Definition:**
Responds to stimuli.

**Sample Verbs:**
- agree to
- answer freely
- assist
- care for
- communicate
- comply
- conform
- consent
- contribute
- cooperate
- follow
- obey
- participate willingly
- react voluntarily
- respond
- visit
- volunteer

**Valuing**

**Definition:**
Attaches value or worth to something.

**Sample Verbs:**
- adopt
- assume responsibility
- behave according to
- choose
- commit
- desire
- exhibit loyalty
- express
- initiate
- prefer
- seek
- show concern
- show continual desire to
- use resources to

**Organizing**

**Definition:**
Conceptualizes the value and resolves conflict between it and other values.

**Sample Verbs:**
- act upon
- advocate
- defend
- exemplify
- influence
- justify behavior
- maintain
- serve
- support

**Internalizing**

**Definition:**
Integrates the value into a value system that controls behavior.

**Sample Verbs:**
- act upon
- advocate
- defend
- exemplify
- influence
- justify behavior
- maintain
- serve
- support

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor. 1956
Rubrics (example)

### PO 1 (Fundamental Knowledge)
Ability to apply knowledge of science, mathematics, civil engineering principles and other relevant field of studies to solve complex engineering problems

<table>
<thead>
<tr>
<th>NO.</th>
<th>CRITERIA</th>
<th>LEVEL 1 (0-39)</th>
<th>LEVEL 2 (40-49)</th>
<th>LEVEL 3 (50-64)</th>
<th>LEVEL 4 (65-79)</th>
<th>LEVEL 5 (80-100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FK-1</td>
<td>Applying the knowledge of mathematics</td>
<td>Unable to define, link and apply mathematical principles in solving basic engineering problem or practice.</td>
<td>Able to <strong>apply</strong> mathematical principles in solving basic engineering problem or practice.</td>
<td>Able to apply the mathematical principles to obtain analytical or numerical solution in solving complex engineering problem or practice.</td>
<td>Able to apply and analyse mathematical principles to obtain analytical or numerical solution in solving complex engineering problem or practice.</td>
<td>Able to combine mathematical principles to formulate analytical or numerical model in solving complex engineering problem or practice.</td>
</tr>
<tr>
<td>FK-2</td>
<td>Applying the knowledge of sciences and civil engineering principles</td>
<td>Unable to define, link and apply scientific and civil engineering principles in solving basic engineering problem or practice.</td>
<td>Able to <strong>apply</strong> scientific and engineering principles in solving basic engineering problem or practice.</td>
<td>Able to apply scientific and engineering principles to obtain analytical or numerical solution in solving complex engineering problem or practice.</td>
<td>Able to apply and analyse scientific and engineering principles to obtain analytical or numerical solution in solving complex engineering problem or practice.</td>
<td>Able to combine scientific and engineering principles to formulate analytical or numerical model in solving complex engineering problem or practice.</td>
</tr>
<tr>
<td>FK-3</td>
<td>Applying the knowledge of other relevant fields</td>
<td>Unable to define, link and apply other relevant fields of studies in solving basic engineering problem or practice.</td>
<td>Able to <strong>apply</strong> other relevant fields of studies to obtain analytical or numerical solution in solving complex engineering problem or practice.</td>
<td>Able to apply other relevant fields of studies to obtain analytical or numerical solution in solving complex engineering problem or practice.</td>
<td>Able to apply and analyse other relevant fields of studies to obtain analytical or numerical solution in solving complex engineering problem or practice.</td>
<td>Able to combine other relevant fields of studies to formulate analytical or numerical model in solving complex engineering problem or practice.</td>
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