“The principle goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done -- men who are creative, inventive and discoverers.” Jean Piaget

“The only person who is educated is the one who has learned how to learn and change.” Carl Rogers

Born & Raised in the state of Hang Jebat…
Early education at St. David’s, Science Malacca (’77-’78) & SDAR (Seremban) (’79)
Teaching Certificate (1986) – MPTI, JB
Served ITM – Jan 1987
Physics & Education expert
- Practiced OBE & Active Learning on his own since 1997.
- Vice-Chair Asian Physics Education Network (ASPEN), UNESCO
- Chair for ASPEN, Malaysia
- Nominated for Innovative Teaching & Learning, National & International
- Keynote, Plenary and Invited Speaker in Conferences Nationally & Internationally
- Liaison officer Between UiTM & JPT on LOKI-based curriculum review
"The MOHE will thus introduce a holistic programme that will cut across all disciplines and focus on communication and entrepreneurial skills. The programme, which is intended to build a balanced perspective in all students, will expose them to subjects beyond their area of specialisation. For example, students reading for degrees in the sciences such as medicine, engineering and chemistry will be exposed to courses covering literature and philosophy. Likewise, students in the humanities will be exposed to the rudiments of science and technology, and certainly, ICT."

Source: NATIONAL HIGHER EDUCATION ACTION PLAN 2007-2010
MOHE’s Attributes of Human Capital with First-Class Mentality:

Knowledge Attributes:
- Mastery of core subjects and ability to apply that knowledge
- Mastery of Bahasa Malaysia and English, and at least one other global language.
- A continuing passion for knowledge through lifelong learning.
- Excellent general knowledge and interest in current events.
- Appreciation of the arts, culture and sports.
- Sound analytical and problem-solving skills.
- Awareness of business and management principles, and technology.

Personal Attributes:
- Goal-oriented: proactive, self-starting, self-disciplined, confident, resilient, motivated, and fiercely competitive.
- Intellectually engaging: creative, innovative, and possessing critical thinking skills.
- Quick learner, adaptable, and flexible.
- Entrepreneurial.
- Ethically and morally upright.
- Spiritually grounded.
- Compassionate and caring (through volunteerism and social services).

Interpersonal Attributes:
- Able communicator and effective presenter.
- Able to relate and be comfortable with people at all levels.
- Able to develop and leverage on personal and professional networks to achieve goals.
- Natural leader.
- Team player.
Why Am I Here
With You. Today
Facilitate OBE-compliant Documents
Develop Program Educational Objectives (PEOs)
Develop Program Outcomes (POs)
Develop PO-PEO matrix
Develop PO-MOHE LO-K1 matrix
Develop COs & SLTs
Develop Course PO-PEO-MOHE LO-TAXONOMY-K1
MENGAPA ANDA DI SINI?

• Bermula 1/1/2009 (2011), MQA akan membuat audit semakan untuk semua program di IPTA, samada yang baru atau yang lama.
• JKPT pula akan fokus kepada semakan Hasil Pembelajaran, Taksonomi dan Kemahiran Insaniah.
• Anda (PM Dr Roziah, Kiranjit & PM DrJJ) telah terpilih untuk menyalurkan maklumat dari mesyuarat ini kepada universiti masing-masing – Bertindak sebagai Liaison officer berkenaan LOKI di antara JPT dan IPTA masing-masing.
Strategi #1 P&P: Menyemak kurikulum berteraskan attributes graduan berkualiti & berdaya saing

<table>
<thead>
<tr>
<th>Pelan Tindakan</th>
<th>Petunjuk Prestasi (KPI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1 Menyebarluaskan kefahaman LO &amp; KI di semua IPT</td>
<td>100% TNC A&amp;A &amp; HEPA menguasai rekabentuk kurikulum berteraskan LO &amp; KI. 1 Prog/IPTA sehingga Dis 2008</td>
</tr>
<tr>
<td>1.1.2 Menyemak semua kurikulum berteraskan LO &amp; KI</td>
<td>100% kurikulum disemak berteraskan LO &amp; KI menjelang 2010</td>
</tr>
<tr>
<td>1.1.3 Menjalankan keperluan pasaran berteraskan kajian halatju prog &amp; kebolehPasaran graduan</td>
<td>100% program kritikal mempunyai kajian halatju &amp; model unjuran pasaran kerja menjelang Julai 2009</td>
</tr>
<tr>
<td>1.1.4 Mendokumentasikan semua kurikulum</td>
<td>100% kurikulum IPT dikelaskan sebagai dokumen kawalan di JPT menjelang 2010</td>
</tr>
</tbody>
</table>

Pelan tindakan P&P

| Pelan Tindakan | Jul '08 | Sep '08 | Okt '08 | Nov '08 | Dis '08 | Jan '09 | Feb '09 | Mar '09 | Apr '09 | Mei '09 | Jun '09 | Jul '09 | Okt '09 | Nov '09 | Dis '09 | Jan '10 | Feb '10 | Mar '10 | Apr '10 | Mei '10 | Jun '10 | Jul '10 |
|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1.1.1 Menyebarluaskan kefahaman LO & KI di semua IPT |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| 1.1.2 Menyemak semua kurikulum berteraskan LO & KI   |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| 1.1.3 Menjalankan keperluan pasaran berteraskan kajian halatju prog & kebolehPasaran graduan |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| 1.1.4 Mendokumentasikan semua kurikulum              |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
Keperluan JKPT

- Memenuhi/mencapai PSPTN Teras Kedua – Menambahbaik Kualiti Pengajaran & Pembelajaran
- Di akhir pengajian di IPTA, pelajar perlu memenuhi attributes/kriteria tertentu. *Yang telah dijanjikan kepada pelajar dalam Hasil Pembelajaran samada Program atau Kursus.*
- Kurikulum pengajian perlu diasaskan kepada kelebaran dan kedalaman yang sesuai i.e. *breadth and depth*
- *Breadth* sesuatu program/kursus boleh dirangka melalui matriks Hasil Pembelajaran dan Kemahiran Insaniah
- *Depth* sesuatu program/kursus boleh dirangka melalui matriks Taksonomi
- *Contoh Matriks* ada disediakan, walau bagaimanapun terpulang kepada IPTA masing-masing untuk menyediakannya mengikut keperluan masing-masing, selagi boleh menyediakannya perancangan dari segi kriteria pelajar, kelebaran dan kedalaman kurikulum.

Objektif semakan kurikulum

- PSPPTN Teras 2
- Pelajar cemerlang
- Penyampaian kurikulum 3-4 tahun (Sarjana Muda)
- Matriks Hasil Pembelajaran
- Matriks Taksonomi
- Matriks Kemahiran Insaniah
- Kriteria pelajar dan kelebaran program/kursus
- Kedalaman program/kursus
- Kelebaran program/kursus

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1. Knowledge (K)
2. Practical Skills (P)
3. Social skills and responsibility (A)
4. Values, attitudes and professionalism (A)
5. Communication, leadership and team skills (P/A)
6. Problem solving and scientific skills (K/P)
7. Information management and lifelong learning skills (P/A)
8. Managerial and entrepreneurial skills (K/P/A)

1. Knowledge (K)
2. Practical Skills (P)
3. Thinking and scientific skills
4. Communication skills
5. Social skills, teamwork and responsibility
6. Values, ethics, moral and professionalism (A)
7. Information management and lifelong learning skills (P/A)
8. Managerial and entrepreneurial skills (K/P/A)
9. Leadership skills

1. Critical thinking and problem solving skills (P)
2. Communication skills (P)
3. Ethics and professionalism (A)
4. Group working skills (A)
5. Lifelong learning and information management (A)
6. Entrepreneurship skills (P)
7. Leadership skills (A)
Outcome Based Education
Functions of MQA

- To implement MQF as a reference point for Malaysian Qualifications
- To develop standards and criteria and all other relevant instruments as national references for the conferment of awards with the cooperation of stakeholders
- To assure quality of HEIs and programmes
- To accredit courses that fulfill the set criteria and standards
- To facilitate the recognition and articulation of qualifications
- To maintain the Malaysian Qualification Register (MQR)
1.1.1 Benchmarked Standards
- The programme must define its aims, objectives and learning outcomes and make them known to its internal and external stakeholders.
- The programme educational objectives (PEOs) must reflect the key elements of the outcomes of higher education that are in line with national and global developments.
- The programme aims, objectives and learning outcomes must be developed in consultation with principal stakeholders which should include the academic staff.
- The programme aims, objectives and learning outcomes must be consistent with, and supportive of, the HEP’s vision and mission.

1.2.1 Benchmarked Standards (Learning Outcomes - POs)
- The programme must define the competencies that the student should demonstrate on completion of the programme that cover mastery of body of knowledge; practical skills; social skills and responsibilities; values, attitudes and professionalism; problem solving and scientific skills; communication, leadership and team skills; information management and lifelong learning skills; and managerial and entrepreneurial skills.
- The programme must demonstrate how the component modules contribute to the fulfillment of the programme’s learning outcomes.
- The programme must show how the student is able to demonstrate the learning outcomes, for example, through summative assessments.
Learning Outcomes
At the end of this session, participants will be able to:

1. Explain and discuss the MQA benchmark standards for Program Educational Objectives and Program Outcomes.
2. Verbally state and explain the concepts used in Outcome-Based-Education (OBE).
3. Discuss the meaning of OBE and apply the meaning to the different levels of curriculum design.
4. Produce a set of Program Educational Objectives (PEO’s)
   • employability attributes
5. Produce a set of Program Outcomes (PO’s)
   • competencies upon completion of program
6. Justify and agree on the PEO’s and PO’s.

Learning Outcomes
At the end of day this session, participants will confidently be able to:

7. Develop the PO’s-PEO’s matrix and the PO’s-MOHE-SS-matrix.
8. Develop the Course-PO-PEO-LO matrix.
9. Develop the Course-Taxonomy matrix
10. Generate the % of courses vs. Depth of taxonomy for the Cognitive, Psychomotor and Affective Domains respectively.
11. Develop Course (CLO) & Subject (SLO or LLO) outcomes for a course.
12. Produce the SLT table for a course & for a program.
The result or consequence of a performance (in terms of success and failure).

The way a thing turns out; a consequence

The outcome of my discussion with PM Dr Rokiah is...

Upon the completion of the Management Mathematics program at UiTM, bumiputra graduates will be able to ......

Upon completion of this talk, we will be able produce a concept map to answer the question “What is OBE”....

What is a Program/Course/Lesson Outcome??

A statement of what students will be able to do when they have completed the program/course/lesson and it involves graduate’s skills and knowledge that arise from the educational activities of the program/course/lesson which lead to the achievement of the Program Objectives

An outcome has three major components:

➢ A description of what the students will be able to do
➢ The conditions under which the students will perform the task.
➢ The criteria for evaluating students' performance.
An outcome at the course level

At the end of this activity, you will be able to write at least 4 attributes of your graduates for the program you are reviewing.

Outcomes:
PEOs, POS, COS
Institutional Attributes

Program level (Still general)

Course Level (Specific but not measurable)

Lesson Level (Very specific & MUST be measurable)

General (not measurable)

Very general attributes (not measurable)

Must include views of stakeholders

stakeholders - students, faculty, alumni, employers of program graduates, and funding sources

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UiTM’s VISION (2006)
➢ To establish UiTM as a premiere university of outstanding scholarship and academic excellence capable of providing leadership to Bumiputera’s dynamic involvement in all professional fields of world-class standards in order to produce globally

UiTM’s PHILOSOPHY (2006)
➢ A believe that every individual has the ability to attain excellence through the transfer of knowledge and the assimilation of moral values so as to become professional graduates capable of developing knowledge, self, society and the nation.

UiTM’s MISSION (2006)
➢ To enhance the knowledge and expertise of Bumiputera’s in all fields of study through professional programmes, research work and community service based on moral values and professional ethics
Outcome Based Education

UiTM: Produce the Human Capital

Knowledgeable  Proactive  Sensitive
Skillful
Creative
Critical
Analytical
Scientific
Competitive
Mentally strong

Excellent Persona
Independent
High morals
Ethical
Religious-conscious

Excellent Persona
Religious-conscious
High morals
Independent
Ethical

Outcome Based Education

OBE

Why change?
Ain’t broken,
why fix it?

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OBE is a method of curriculum design and teaching that focuses on what students can actually do after they are taught. OBE addresses the key questions as:

- Why do you want them to learn it? – **Vision, Mission, PEOs, POs**
- What do you want the students to learn? – **course structure, syllabus**
- How can you best help students learn it? – **Learning Activities**
- How will you know what they have learnt? - **Assessment**
Towers (1996) listed four points to the OBE system that are necessary to make it work:

a) What the student **is to learn must be clearly identified**.
b) The student’s progress is based on demonstrated achievement.
c) **Multiple instructional and assessment strategies** need to be available to meet the needs of each student.
d) **Adequate time and assistance need to be provided** so that each student can reach the maximum potential.

The desired outcome is selected first and the curriculum, instructional materials and assessments are created to support the intended outcome (Spady 1988; 1993).

**All curriculum and teaching decisions are made based on how best to facilitate the desired final outcome.**
OBE is able to measure—‘what the students are capable of doing’

OBE goes beyond ‘structured tasks’ (e.g. memorization)

OBE demands that students demonstrate his/her skills through more challenging tasks like writing project proposals and completing the projects, analyzing case studies and giving case presentations etc. Such exercises require students to practice and demonstrate their ability to think, question, research, make decisions and give presentations.

OBE is able to measure—‘what the students are capable of doing’

OBE involves students in a complete course of learning, developing their skills in designing to completing a whole process (Spady, 1994a, 1995).

OBE also identifies higher levels of thinking (e.g. creativity, ability to analyze and synthesize information, ability to plan and organize tasks). Such skills are emphasized especially when students are assigned to organize and work as a community or entrepreneurial service teams to propose solutions to problems and market their solutions.
1. Clarity of focus about outcomes
- Always have the significant, culminating exit outcomes as the focus.
- Let the students know what they are aiming for.

2. Designing backwards
- Design curriculum backward by using the major outcomes as the focus and linking all planning, teaching and assessment decisions directly to these outcomes.

3. Consistent, high expectations of success
- Set the expectation that OBE is for ALL learners.
- Expect students to succeed by providing them encouragement to engage deeply with the issues they are learning and to achieve the high challenging standard set (Spady, 1994b).

4. Expanded opportunity
- Develop curriculum to give scope to every learner to learn in his/her own pace.
- Cater for individual needs and differences, for example, expansion of available time and resources so that all students succeed in reaching the exit outcomes.
MQF for Diploma

Degree & Masters

MQF Framework for University Preparatory level-Outcomes

Foundation or University Preparatory Course

Foundation Courses or University Preparatory Courses such as Sijil Tinggi Persekolahan Malaysia (STPM), Matriculation and Foundation Certificates are not in the MQF as they are the entry qualifications to universities. Nonetheless, MQF determines standards for these certificates to ensure comparability and standardisation of student abilities. Generally, these are conferred on students who are able to:

(i) show knowledge and comprehension in the field of study that is continued from secondary school as indicated in advanced text books;

(ii) use knowledge and comprehension to identify and use data in respond to concrete and complex problems;

(iii) communicate and clarify understanding and skills to peers and supervisors; and

(iv) demonstrate skills for purposes of pursuing higher education.
**MQF Framework for Preparatory level-Outcomes**

**Knowledge & Comprehension**
- basic concepts of the relevant academic disciplines that enable students to enter Arts or Science based university courses

**Intellectual Skills**
- skills of the different approaches to solving problems

**Psychomotor Skills**
- basic laboratory skills, project work, group work and field activities.

**Generic Skills**
- communicate accurately, effective use of ICT
- Some exercise of personal responsibility

---

**MQF Framework for Diploma level-Outcomes**

Diploma level education balances theory and practice or practical, and stresses on the instillation of values, ethics and attitudes to enable students to:

(i) use knowledge, comprehension and practical skills at work;
(ii) assess and decide, taking into account social, scientific and ethical issues with moderate autonomy;
(iii) be confident and entrepreneurial in pursuing their own careers;
(iv) be responsible members of society;
(v) possess study skills in adapting to ideas, processes and new procedures for career development;
(vi) acquire team and interpersonal skills that are appropriate to employment; and
(vii) communicate effectively and to transmit information, ideas, problems and resolutions cogently to experts and non-experts.
**MQF Framework for Diploma level-Outcomes**

**Knowledge & Comprehension**
- breadth, depth and complexity of knowledge for complex skills (degree of emphasis on breadth as against depth of knowledge may vary between qualifications granted at this level)

**Intellectual Skills**
- substantial degree of judgment for problem solving

**Psychomotor Skills**
- perform a broad range of complex technical operations

**Generic Skills**
- Communication & participation in teams
- Exercise responsibility and substantial autonomy for own continuing learning Some exercise of personal responsibility
- work related attitudes and ethics shown in exercise of responsibility and substantial autonomy for own output in work and responsibility for the work of others

**MQF – Bachelors degree (Hons.)**

A Bachelors degree prepares students for general employment, entry into postgraduate programme and research as well as highly skilled careers. It enables the individuals to pair responsibilities, which require great autonomy in professional decision-making. The bachelors degree is conferred on individuals who are able to:

(i) demonstrate knowledge and comprehension on fundamental principles of a field of study, acquired from advanced textbooks;
(ii) use the knowledge and comprehension through methods that indicate professionalism in employment;
(iii) argue and solve problems in their field of study;
(iv) show techniques and capabilities to search and use data to make decisions having considered social, scientific and relevant ethical issues;
(v) communicate effectively and convey information, ideas, problems and solutions to experts and non-experts;
(vi) apply team and interpersonal skills which are suitable to employment; and
(vii) possess independent study skills to continue further study with a high degree of autonomy.
**mqf framework for degree level-outcomes**

**knowledge & comprehension**
- systematic and coherent body of complex knowledge, some of it at the boundaries of an academic discipline
- major studies in which significant literature is available. Course content is taken to a significant depth and progressively developed to a high level which provides a basis for postgraduate study and professional careers.

**intellectual skills**
- analytical techniques and problem solving skills that can be applied in many types of employment, including in a professional

**psychomotor skills**
- practical skills relevant to the discipline

**generic skills**
- communicate effectively.
- interpersonal and team skills appropriate for employment
- prepared to undertake research, comprehend and evaluate new information and concepts from a range of sources, weigh evidence, arguments and assumptions, to reach sound judgments,
- have developed a foundation for self-directed and life long learning
- exercise of substantial personal responsibility and decision-making in complex and unpredictable circumstances.
- Observation of professional ethics
MQF – Masters Degree

Masters

A Masters Degree provides for the furtherance of knowledge, skills and abilities obtained at the Bachelors level. The entrance to masters is usually based on proven capabilities to pursue postgraduate studies in the selected fields. A masters degree is conferred on students who are able to:

(i) demonstrate continuing and additional knowledge and comprehension above that of the bachelors degree and have capabilities to develop or use ideas, usually in the context of research;
(ii) use the knowledge and comprehension to solve problems related to the field of study in new situations and multi-disciplinary contexts;
(iii) integrate knowledge and manage complex matters;
(iv) evaluate and make decision in the situations without or with limited information by considering social responsibilities and related ethics;
(v) deliver clearly the conclusion, knowledge and the rationale to experts and non-experts; and
(vi) demonstrate study skills to continuously progress on their own with a high degree of autonomy to do so.

MQF – Doctoral

Doctoral

A Doctoral Degree provides for the further enhancement of knowledge, skills and abilities obtained at the masters level. It generally provides the graduate with the abilities to conduct independent research and is conferred on students who are able to:

(i) show a systematic comprehension and in depth understanding of a discipline and mastery of skills and research methods related to the field of study;
(ii) show capabilities to generate, design, implement and adopt the integral part of research process with scholarly strength;
(iii) contribute to the original research that has broadened the boundary of knowledge through an in-depth dissertation, which has been presented and defended according to the international standards including writing in internationally refereed publications;
(iv) make critical analysis, evaluation and synthesis of new and complex ideas;
(v) communicate with peers, scholarly communities and society at large concerning the field of expertise; and
(vi) promote the technological, social and cultural progress in a knowledge based society in the academic and professional contexts.
### Domains of Learning

**Cognitive Skills (psychomotor)**

Affective (attitudes, feelings...)

### Cognitive Domain

**thinking, knowledge**

<table>
<thead>
<tr>
<th>Lower order</th>
<th>Higher order</th>
</tr>
</thead>
</table>

#### Knowledge

**Definition:** Remembers previously learned material.

**Sample Verbs:**
- define
- identify
- spell
- list
- names
- recall
- citing

#### Comprehension

**Definition:** Understands the meaning of concepts and principles.

**Sample Verbs:**
- explain
- discuss
- explain
- compare
- analyze
- paraphrase
- give examples
- translate

#### Application

**Definition:** Uses learning in new and complex situations (higher level of understanding).

**Sample Verbs:**
- apply
- carry out
- demonstrate
- evaluate
- translate
- etc.

#### Analysis

**Definition:** Understands both the content and structure of material.

**Sample Verbs:**
- analyze
- categorize
- compare
- summarize
- discriminate
- subsume

#### Synthesis

**Definition:** Formulates new ideas from existing knowledge and skills.

**Sample Verbs:**
- formulate
- construct
- design
- develop
- generate
- plan
- propose

#### Evaluation

**Definition:** Judges the value of materials or a given process.

**Sample Verbs:**
- assess
- evaluate
- interpret
- predict
- select
- report

---

*Based on “Taxonomy of Educational Objectives”, B. S. Bloom, Editor, 1956*
Psychomotor Domain

**Higher order**

**Guided Response**

- Definition: Initiates and coordinates skills, often in alternate aleas.
- Sample Verbs: • employ • duplicate • manipulate with guidance • operate under supervision • produce • write
- Complete Overt Response
- Definition: Performs tasks with efficiency, proficiency.
- Sample Verbs: • act confidently • achieve with assurance • control • direct
- Organization
- Definition: Creates new patterns for specific situations.
- Sample Verbs: • design • originate • coordinate • compose • construct

**Psychomotor Domain INCLUDES PHYSICAL MOVEMENT, COORDINATION & USE OF THE MOTOR SKILL AREAS**

**Organization**

**Adaptation**

**Affective Domain**

**Lower order**

**Perception**

- Definition: Stimulates that guide motor activity.
- Sample Verbs: • detect • hear • listen • observe • perceive • recognize • see • sense • smell • taste • touch • watch

**Valuing**

- Definition: Attaches value or worth to something.
- Sample Verbs: • adopt • assume responsibility • behave according to principles • commit • decide • exhibit loyalty • express • present • profit • sell • show concern • show reverence • show respect • use intuition to

**Things emotionally (e.g. feelings, interests, attitudes, appreciation, enthusiasms, motivations) - that might result from instruction**

**Internalizing**

- Definition: Integrates the values into a value system that directs behavior.
- Sample Verbs: • act upon • appreciate • define • discourage • influence • justify behavior • maintain • oppose • support

**Responding**

- Definition: Responds to stimuli.
- Sample Verbs: • accept • adjust to • tolerate • trust • understand • listen • not argue • pay attention • tolerate

**Psychomotor Domain INCLUDES PHYSICAL MOVEMENT, COORDINATION & USE OF THE MOTOR SKILL AREAS**

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor, 1956.

Outcome Based Education

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COURSE: PHY407

Course Outcomes: Upon completion of this course, students will be able to:

1. **State, write and explain** the concepts, laws and theories in electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (C-Knowledge) (PO1)

2. **Verbally, visually (pictures & graphs) and algebraically relate and discuss** the concepts, laws and theories in electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (C-Comprehension) (PO1, PO6)

3. **Verify, assess & employ** the concepts, laws and theories in electrostatics, electricity, magnetism, light, introductory atomic physics and modern physics to solve qualitative & quantitative problems visually, algebraically and occasionally, numerically. (C-Application) (PO1)

4. **Analyze, summarize and discuss** solution to real world problems associated with electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (for 3rd year course only) (PO1, 6, 8)

5. **Observe, formulate, plan, conduct, and report** scientific investigations in areas of electrostatics and electricity. (PO2, 3, 6)

6. **Verbally justify and convince peers** and the facilitator, their rationale for the choice of methods, their ability to use and manipulate equipments, the need to transform raw scores into tabular and graphical forms and their ability to explain and interpret results of their investigation in areas of electrostatics and electricity. (PO2, 3, 7)

7. **Collaborate, motivate and truthful** with team members and with facilitators in both the labs and in the classroom. (PO5, 8)
COURSE: FSG500-Philosophy of Science

1. **Identify** their learning preferences, attitudes towards science and conceptual understanding in their field of study.

2. **Define** truth, beliefs and knowledge and justify their own belief about science knowledge in chemistry or physics through conceptual inventories.

3. **Apply** the philosophical approach in analyzing and justifying the scientific methods, principles, laws and theories about the natural world.

4. **Identify** their science reasoning skills.

5. **Argue and justify** their opinion on issues in philosophy of science

6. **Critically write** an original 3000 words position paper in favor or against issues on science that concern ethics and morality.

---

At the end of this activity students will be able to:

1. Draw the electric force exerted by one point charge onto another and describe the motion of charges in the presence of other point charges.
2. Describe the cause of motion between point charges.
3. Describe and produce a model of the force in terms of the strength and direction that are acting on and by a point charge and on and by many point charges.
At the end of this activity students will be able to:

4. Describe and draw the electric field patterns created by point charges surrounding a point charge.
5. Describe and draw the electric field patterns surrounding two like point charges and two unlike point charges.
6. Measure the strength of an electric field produced by a point charge at various localities and produce a mathematical model of the strength.
### How Does MQF Affect Teaching-Learning?

#### Teacher - centered vs. Student - centered

<table>
<thead>
<tr>
<th>Course Objective is the Learning Target</th>
<th>No mapping of learning outcomes</th>
<th>Student Independent Learning Not Calculated</th>
<th>Contact hours Reflects Credit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Outcomes is the Learning Target</td>
<td>Mapping of learning outcomes necessary</td>
<td>Student Independent Learning Time Calculated</td>
<td>Total SLT reflects Credit value</td>
</tr>
</tbody>
</table>

### Lecturer-Centred to Student-Centred

(incorporating SLT)

<table>
<thead>
<tr>
<th>Academic Activity (some examples)</th>
<th>Face 2 Face</th>
<th>Student Self-Learning*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Tutorial</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Laboratory/Practical</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Assignment - 2000 words</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Presentation</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
<td><strong>30</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

* Using the Proposed student independent learning in relation to

---

MQF in Programmes.Roz.Roadshow

---

MQF in Programmes.Roz.Roadshow
A credit is the agreed-upon value used to measure a student's workload in terms of learning time required to complete course units, resulting in learning outcomes (UNESCO, 2004).

Credit = the measurement of students' academic load

Factors In Calculating Credit

Face to Face / Guided Learning Time +

Student Self Learning Time +

Total Assessment Time
## Student Categories & 130 credit Bachelors

<table>
<thead>
<tr>
<th>Item</th>
<th>Least Diligent</th>
<th>Diligent</th>
<th>Very Diligent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of weeks in a semester (A)</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Recommended SLT per week (B)</td>
<td>40</td>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td>Recommended total SLT per semester (C) [A × B]</td>
<td>610</td>
<td>816</td>
<td>913</td>
</tr>
<tr>
<td>Recommended credit per semester (D) [C + 4D]</td>
<td>17</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>[E + D]</td>
<td>(20,4)</td>
<td>(23,4)</td>
<td></td>
</tr>
<tr>
<td>Total graduating credit for programme (E)</td>
<td>130</td>
<td>130</td>
<td>130</td>
</tr>
<tr>
<td>Number of semesters (long semester) [F]</td>
<td>7.6</td>
<td>6.5</td>
<td>5.7</td>
</tr>
<tr>
<td>[E + D]</td>
<td>(7.64)</td>
<td>(5.60)</td>
<td></td>
</tr>
<tr>
<td>Number of academic year (2 long semesters 1 year) [F + 2]</td>
<td>3.8</td>
<td>3.3</td>
<td>2.9</td>
</tr>
<tr>
<td>[3.25]</td>
<td>(2.88)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Proposed by MQA, depending on the field of study and the intensity of the examination.*

## Proposed student independent learning time

<table>
<thead>
<tr>
<th>Item</th>
<th>Duration (hours) or requirements</th>
<th>Proposed Student Self Learning Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>1</td>
<td>1-2</td>
</tr>
<tr>
<td>Tutorial</td>
<td>1</td>
<td>1-2</td>
</tr>
<tr>
<td>Tutorial (involving case studies)</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Laboratory (including report writing)</td>
<td>3</td>
<td>2-3</td>
</tr>
<tr>
<td>Undergraduate Final Year Project/Dissertation</td>
<td>6 - 10 credits</td>
<td>200 - 400</td>
</tr>
<tr>
<td>Studio Work</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Presentation</td>
<td>1</td>
<td>3-4</td>
</tr>
<tr>
<td>Coursework/Assignment</td>
<td>2000 words</td>
<td>10 - 12</td>
</tr>
<tr>
<td>Creative Writing</td>
<td>100 – 130 pages</td>
<td>8-10</td>
</tr>
<tr>
<td>Examination</td>
<td>3</td>
<td>10 – 20*</td>
</tr>
</tbody>
</table>

*Proposed by MQA, depending on the field of study and the intensity of the examination.*
### Learning Outcomes and Student Learning Time

**Learning Outcomes and Student Learning Time**

(A subject with 6 learning outcomes and 1.5 credit hours)

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Lecture</th>
<th>Tute</th>
<th>Self-learning</th>
<th>Total SLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Explain the types of contracts;</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>2. Distinguish between offer, acceptance and an invitation to treat;</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>3. Differentiate the types considerations;</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4. Describe the principles concerning termination and breach of contract;</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>5. Summarize principles of damages;</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>6. Examine, analyze, compile, apply and justify the principles of contract in given scenario.</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>- Summarize principles of damages;</td>
<td>0</td>
<td>4</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

### Module Academic Load & Credits

<table>
<thead>
<tr>
<th>Learning Activities</th>
<th>SLT (in hours)</th>
<th>Learning Activities</th>
<th>SLT (in hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lectures</td>
<td>(54)</td>
<td>4. Assessments</td>
<td>(23)</td>
</tr>
<tr>
<td>a. Attending Lecture</td>
<td>24</td>
<td>a. 1 continuous assessment (1 hour + 3 hours preparation*)</td>
<td>4</td>
</tr>
<tr>
<td>b. Pre and Post preparation*</td>
<td>30</td>
<td>b. 1 presentation (1 hour + 5 hours preparation*)</td>
<td>6</td>
</tr>
<tr>
<td>2. Tutorial</td>
<td>(18)</td>
<td>c. 1 Final Examination (3 hour + 10 hours preparation*)</td>
<td>13</td>
</tr>
<tr>
<td>a. Attending tutorial</td>
<td>9</td>
<td><strong>Total</strong></td>
<td><strong>131</strong></td>
</tr>
<tr>
<td>b. Preparation for tutorial*</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Laboratory</td>
<td>(36)</td>
<td><strong>Subject Credit</strong></td>
<td>(131 ÷ 40 = 3.27)</td>
</tr>
<tr>
<td>a. Practical</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Preparation and Report writing*</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* See Proposed student independent learning in relation (Slide 17)
## Credits per semester

<table>
<thead>
<tr>
<th>Modules</th>
<th>Face to Face Learning</th>
<th>Independent Learning</th>
<th>Lab Hours</th>
<th>Evaluation</th>
<th>Total SLT</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Genetics</td>
<td>42 (+1)</td>
<td>42</td>
<td>26</td>
<td>16</td>
<td>126</td>
<td>3</td>
</tr>
<tr>
<td>2 Biochemistry</td>
<td>42 (+1)</td>
<td>42</td>
<td>26</td>
<td>16</td>
<td>126</td>
<td>3</td>
</tr>
<tr>
<td>3 Cell Biology</td>
<td>42 (+1)</td>
<td>42</td>
<td>12</td>
<td>16</td>
<td>112</td>
<td>3</td>
</tr>
<tr>
<td>4 ICT</td>
<td>28 (+1)</td>
<td>28</td>
<td>14</td>
<td>10</td>
<td>80</td>
<td>2</td>
</tr>
<tr>
<td>5 English</td>
<td>42 (+1)</td>
<td>63</td>
<td>14</td>
<td>7</td>
<td>127</td>
<td>3</td>
</tr>
<tr>
<td>6 Moral/Islamic Studies</td>
<td>28 (+1)</td>
<td>42</td>
<td>0</td>
<td>10</td>
<td>80</td>
<td>2</td>
</tr>
<tr>
<td>7 Anatomy</td>
<td>70 (1+2)</td>
<td>42</td>
<td>0</td>
<td>16</td>
<td>128</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>294</strong></td>
<td><strong>301</strong></td>
<td><strong>92</strong></td>
<td><strong>91</strong></td>
<td><strong>778</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>
Course Outcomes: Upon completion of this course, students will be able to:

1. **State, write and explain** the concepts, laws and theories in electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (C-Knowledge) (PO1)

2. **Verbally, visually (pictures & graphs) and algebraically relate and discuss** the concepts, laws and theories in electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (C-Comprehension) (PO1, PO6)

3. **Verify, assess & employ** the concepts, laws and theories in electrostatics, electricity, magnetism, light, introductory atomic physics and modern physics to solve qualitative & quantitative problems visually, algebraically and occasionally, numerically. (C-Application) (PO1)

4. **Analyze, summarize and discuss** solution to real world problems associated with electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (for 3rd year course only) (PO1, 6, 8)

5. **Observe, formulate, plan, conduct, and report** scientific investigations in areas of electrostatics and electricity. (PO2, 3, 6)

6. **Verbally justify and convince peers** and the facilitator, their rationale for the choice of methods, their ability to use and manipulate equipments, the need to transform raw scores into tabular and graphical forms and their ability to explain and interpret results of their investigation in areas of electrostatics and electricity. (PO2, 3, 7)

7. **Collaborate, motivate and truthful** with team members and with facilitators in both the labs and in the classroom. (PO5, 8)
Writing Course Outcomes

COURSE: FSG500-Philosophy of Science
1. Identify their learning preferences, attitudes towards science and conceptual understanding in their field of study.
2. Define truth, beliefs and knowledge and justify their own belief about science knowledge in chemistry or physics through conceptual inventories.
3. Apply the philosophical approach in analyzing and justifying the scientific methods, principles, laws and theories about the natural world.
4. Identify their science reasoning skills.
5. Argue and justify their opinion on issues in philosophy of science.
6. Critically write an original 3000 words position paper in favor or against issues on science that concern ethics and morality.

Domains of Lifelong Learning

Cognitive (Head)
Knowledge & Comprehension
Intellectual Skills (Application, Analysis, Synthesis, Creativity & Evaluation)
Psychomotor (Hand)-Practical Skills
& Affective (Values, Appreciation & Ethics)
The 3 Domains of Educational Goals

Cognitive
The Head

Affective
The Heart

Psychomotor
The Hand

Course outcomes

DOMAINS
Cognitive
Affective
Psychomotor / skills

Higher order
Evaluation
Synthesis
Analysis
Application
Comprehension
Knowledge

Lower order
Exhibit, display, demonstrate
organisation
Valuing
Responding
Receiving

Naturalisation
Articulation
Precision
Manipulation
Imitation
Cognitive Domain  
(thinking, knowledge)

**Lower order**

**Comprehension**
- **Definition:** Understands the meaning of material (lower level of understanding).
- **Sample Verbs:**
  - define
  - identify
  - label
  - list
  - locate
  - paraphrase
  - give examples
  - translate

**Knowledge**
- **Definition:** Recalls previously learned material.
- **Sample Verbs:**
  - describe
  - discuss
  - explain
  - locate
  - paraphrase
  - give examples
  - translate

**Application**
- **Definition:** Uses learning in new and contexts situations (higher level of understanding).
- **Sample Verbs:**
  - apply
  - apply rule
  - demonstrate
  - illustrate
  - prepare
  - solve
  - write

**Higher order**

**Analysis**
- **Definition:** Understands both the content and structure of material.
- **Sample Verbs:**
  - analyze
  - compare
  - contrast
  - differentiate
  - discriminate
  - outline

**Synthesis**
- **Definition:** Formulates new structure from existing knowledge and skills.
- **Sample Verbs:**
  - contribute
  - design
  - develop
  - generate
  - plan
  - propose

**Evaluation**
- **Definition:** Judges the value of material for a given purpose.
- **Sample Verbs:**
  - assess
  - evaluate
  - examine
  - judge
  - select
  - support

**Categories in the Cognitive Domain**  
(Taxonomy of Educational Objectives, Bloom, 1956)

<table>
<thead>
<tr>
<th>Level 1 – Knowledge</th>
<th>Level 2 – Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>The remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.</td>
<td>The ability to grasp the meaning of material. This may be shown by translating material from one form to another, by interpreting material (explaining or summarising), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material, and represent the lowest level of understanding.</td>
</tr>
<tr>
<td>Defines, describes, identifies, labels, lists, matches, names, outlines, reproduces, selects, states.</td>
<td>Converts, defends, distinguishes, estimates, explains, extends, generalises, gives examples, infers, paraphrases, predicts, rewrites, summarises.</td>
</tr>
</tbody>
</table>
| Eg.  
  - List the six levels in the cognitive domain of Bloom’s taxonomy.  
  - Define...  
  - State the main principles of Theory X. | Eg.  
  - Describe three main features of...  
  - Explain the 3 main components of a learning outcome.  
  - Summarise the main causes of the American war in Iraq. |

*Based on "Taxonomy of Educational Objectives", B. S. Bloom Editor 1956*
### Bloom’s Taxonomy

<table>
<thead>
<tr>
<th>Level 3 – Application</th>
<th>Changes, computes, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.</th>
</tr>
</thead>
</table>
| The ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws and theories. Learning outcomes in this area require a higher level of understanding than those under ‘Comprehension’. | E.g.:  
- Construct measurable learning outcomes that include lower and higher order cognitive skills for a one-semester course. |

<table>
<thead>
<tr>
<th>Level 4 – Analysis</th>
<th>Breaks down, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, points out, relates, selects, separates, subdivides</th>
</tr>
</thead>
</table>
| The ability to break down material into its component parts so that its organisational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organisational principles involved. Learning outcomes here represent a higher intellectual level than ‘Comprehension’ and ‘Application’ because they require an understanding of both the content and the structural form of the material. | E.g.:  
- Analyse authentic data from various sources and prepare... |

<table>
<thead>
<tr>
<th>Level 5 – Synthesis</th>
<th>Categorises, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organises, plans, rearranges, revises, rewrites, summarises, tells, writes.</th>
</tr>
</thead>
</table>
| The ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviours, with major emphasis on the formulation of new patterns or structures. | E.g.:  
- Analyse authentic data from various sources and prepare a recommendation report for a specified audience. |

<table>
<thead>
<tr>
<th>Level 6 – Evaluation</th>
<th>Appraises, compares, concludes, contrasts, criticises, describes, discriminates, explains, justifies, interprets, relates, summarises, supports.</th>
</tr>
</thead>
</table>
| The ability to judge the value of material. The judgements are to be based on definite criteria. These may be internal criteria (organisational) or external criteria (relevance to the purpose) and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all the other categories, plus conscious value judgements based on clearly defined criteria. | E.g.:  
- Evaluate the strengths and weaknesses of the cognitive domain of Bloom’s taxonomy in relation to the National Educational Philosophy. |
**Psychomotor Domain**

*(doing, skills)*

**Guided Response**

**Mechanism**

- **Set**
  - Definition: Induces and coordinates skills, often in alternate alleys.
  - Sample Verbs: easy, duplicate, manipulate, operate, supervise, interact, try.

**Complete Over Response**

- Definition: Performs task with thoroughness, effectiveness, and proficiency.
- Sample Verbs: set initially, advance with assurance, control, guide, manage, maintain, perfect, perform, automatically.

**Adaptation**

- Definition: Adapts skill sets to meet a problem situation.
- Sample Verbs: adapts, recognizes, changes.

**Organization**

- Definition: Creates new patterns for specific situations.
- Sample Verbs: designs, originates, coordinates, compiles, constructs.

**Psychomotor Domain Includes Physical Movement, Coordination & Use of the Motor Skill Areas**

**Affective Domain**

*(feeling, attitudes)*

**Valuing**

- Definition: Attaches value or worth to something.
- Sample Verbs: adopt, assume responsibility, behave according to, changes, commit, devote, exhibit loyalty, express, value, profit, seek, show concern, submit, convey, claim, convey, use interaction.

**Responding**

- Definition: Responds to stimuli.
- Sample Verbs: accept, adopt, believe, disagree, cooperate, create, elect, independently, instruct, listen, negotiate, pay attention, tolerate.

**Internalizing**

- Definition: Integrates the values into a value system that controls behavior.
- Sample Verbs: act, upon, appropriate, defend, develop, influence, justify, maintain, support.

**Things Emotionally (e.g. Feelings, Interests, Attitudes, Appreciation, Enthusiasms, Motivations) - That Might Result from Instruction**

---

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor, 1956.
Course outcome for Thermodynamics: (address PO1)
- Write energy balance representing the first law of thermodynamics and use it in both closed and open systems.

Lesson outcomes: Upon completion of this unit, students will be able to:
1. State the conservation of energy principle and name all the forms of energy entering & leaving a system and energy changes within the system.
2. Discuss the energy exchange process and write mathematical expressions representing the energy balance in units of kJ, for a general system undergoing any process.
3. Rewrite the energy balance in the unit-mass basis and unit-time basis (or rate-form basis) for a general system undergoing any process.

### Action Plan

<table>
<thead>
<tr>
<th>Action</th>
<th>Lead Agency</th>
<th>Deliverable</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design holistic programmes: students in the pure sciences will be exposed to humanities subjects, and vice versa. Run in tandem with programmes on culture and diversity.</td>
<td>T&amp;L Taskforce</td>
<td>Balanced and well-rounded education</td>
<td>2008-Q4</td>
</tr>
<tr>
<td>Exchange programme for top students to spend one semester in select foreign universities.</td>
<td>T&amp;L Taskforce</td>
<td>Student-exchange programmes.</td>
<td>2008-Q3</td>
</tr>
<tr>
<td>Implement programmes to enlist industry leaders to play an active role in curriculum design as well as in teaching.</td>
<td>T&amp;L Taskforce</td>
<td>Latest and most relevant developments in the industry</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Embed career skills development into teaching and learning of core curriculum. Career skills to include soft skills, IT awareness, and entrepreneurship.</td>
<td>T&amp;L Taskforce, MORE, Industry, HEI</td>
<td>Critical thinking, communication skills, English proficiency and IT skills</td>
<td>2008-Q2 (Pilot)</td>
</tr>
</tbody>
</table>
Education, we see, is not merely gaining knowledge or skills helpful toward productive work, though certainly that is a part of it. Rather it is a replenishment and an expansion of the natural thirst of the mind and soul. Learning is a gradual process of growth, each step building upon the other. It is a process whereby the learner organizes and integrates not only facts but attitudes and values. The Lord has told us that we must open our minds and our hearts to learn. There is a Chinese proverb: Wisdom is as the moon rises, perceptible not in progress but in result. As our knowledge is converted to wisdom, the door to opportunity is unlocked.

Barbara W. Winder

The great aim of education is not knowledge, but action.
Herbert Spencer

The one real goal of education is to leave a person asking questions.
Max Beerbohm
### Paradigm Shift in HE

**Ready for CHANGE??**

Source: MPTN

<table>
<thead>
<tr>
<th></th>
<th>Diploma</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>20%-30%</td>
<td>40%-60%</td>
</tr>
<tr>
<td>Skills</td>
<td>45%-60%</td>
<td>15%-45%</td>
</tr>
<tr>
<td>Affective</td>
<td>15%-25%</td>
<td>15%-25%</td>
</tr>
</tbody>
</table>

Source: MPTN

---

**Outcome Based Education**

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