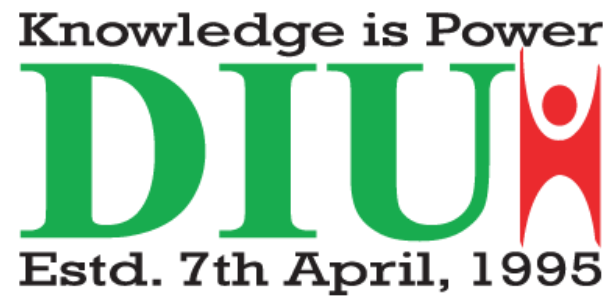


Outcome Based Education



Md Rakib Hossain

Lecturer, Dept. of CSE
Dhaka International University

June 04, 2024

Traditional Teaching & Learning Approach

- Teaching is a one-way communication
- Curriculum/Syllabus/Knowledge/Material delivery totally dependent on Teacher/Lecturer
- Pace at which the materials are delivered depend on a fixed schedule
- Assessments largely monotonous
- Assessments usually used to differentiate the students' knowledge

Effective Approach to Teaching & Learning

- Teaching is a two-way communication
- Curriculum/Syllabus/Knowledge/Material delivery dependent on the Students' Understanding/Capability
- Pace at which the materials are delivered depend on the students
- Assessments are designed based on the Nature of the Outcome
- Assessments are designed to enable the Students to Demonstrate the Learning Outcomes.

Teacher-Centered vs Student Centered Learning

| Elements | Teacher-Centered | Student-Centered |
|-----------------------|-------------------------------|----------------------------------|
| Knowledge | Transmitted from instruction | Constructed by Students |
| Student Participation | Passive | Active |
| Role of Lecturer | Few Tests, Mainly for Grading | Many Tests, for Ongoing Feedback |
| Emphasis | Learning Correct Answers | Developing Deeper Understanding |
| Assessment Method | One-Dimensional Testing | Multidimensional Testing |
| Academic Culture | Competitive, Individualistic | Collaborative, Supportive |

Outcome-Based Education (OBE)

Outcome-Based Education (OBE) is a student-centric teaching and learning methodology in which the course delivery and assessment are planned to achieve stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes (in terms of knowledge, skills, attitudes and behaviour) at different levels at the end of the program.



Benefits of OBE

- Clarity
 - Flexibility
 - Employment Opportunities: Relevance and Practicality
 - Lifelong Learning Skills
 - Continuous Improvement
 - Enhanced Assessment and Feedback
 - Quality Assurance
 - Continuous Improvement
 - Transparency and Accountability
 - Recognition
 - OBE is an accreditation
- 



The Washington Accord

- **International Agreement:** It is an agreement to accept engineering degrees that were obtained using OBE methods.
- **Established in 1989:** Promotes global mobility and standardization of engineering education.
- **Member Countries:** Includes over 20 countries with diverse educational systems.

Benefits of Washington Accord Membership for Bangladesh

- **Global Recognition:** Degrees recognized internationally, enhancing graduate mobility.
- **Quality Assurance:** Ensures high standards in engineering education.
- **Industry Alignment:** Graduates equipped with skills to meet modern workforce demands.
- **International Collaboration:** Facilitates knowledge exchange and research collaborations.

Accreditation and IEB

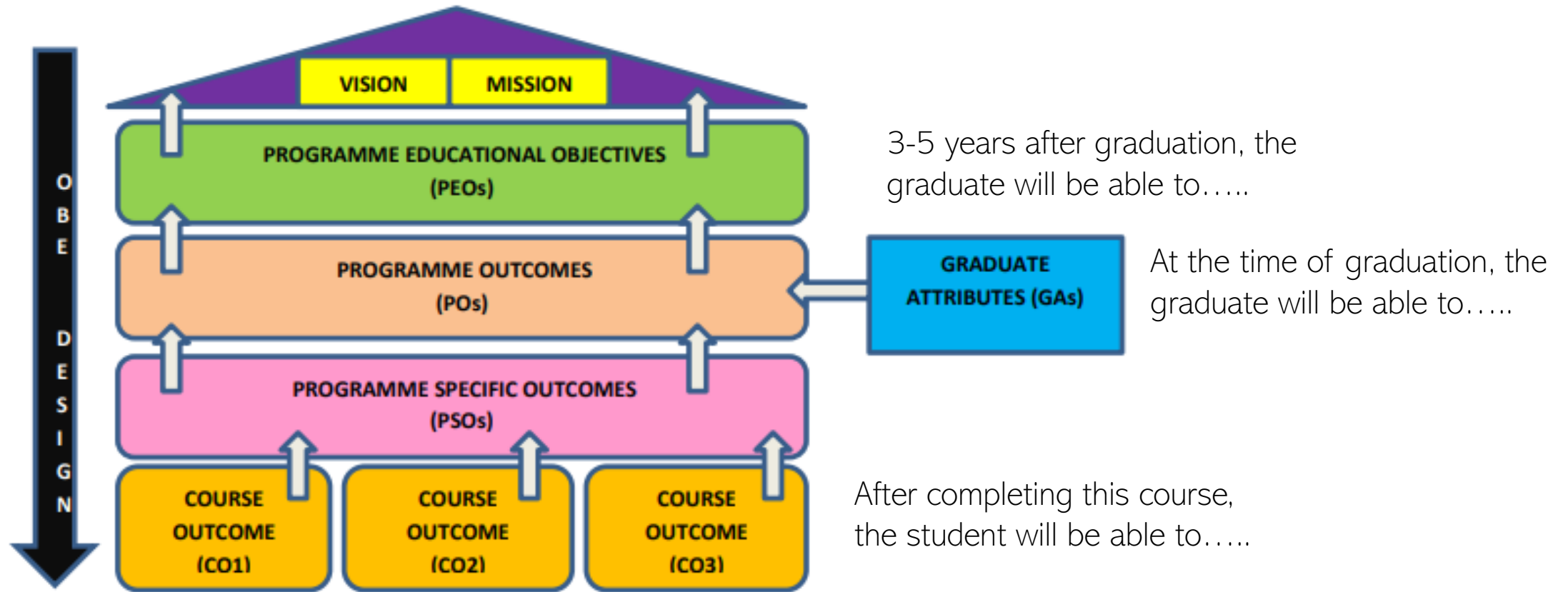
❑ Role of Institutional Engineers Bangladesh

- Premier Professional Body
- Accreditation Standards
- Continuous Professional Development

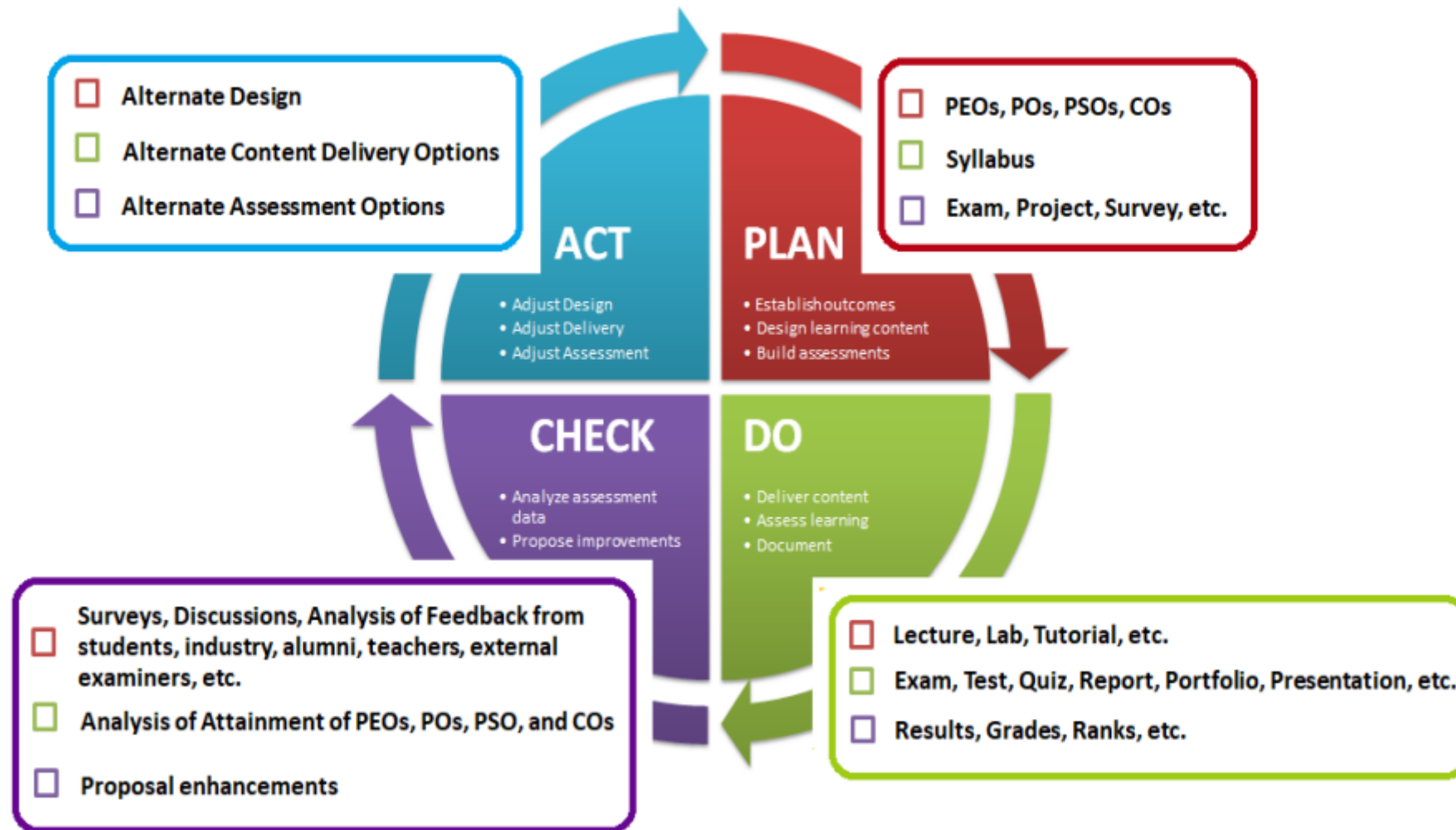
❑ IEB's Implementation of OBE

- Curriculum Development
- Faculty Training
- Quality Assurance
- Accreditation and Monitoring

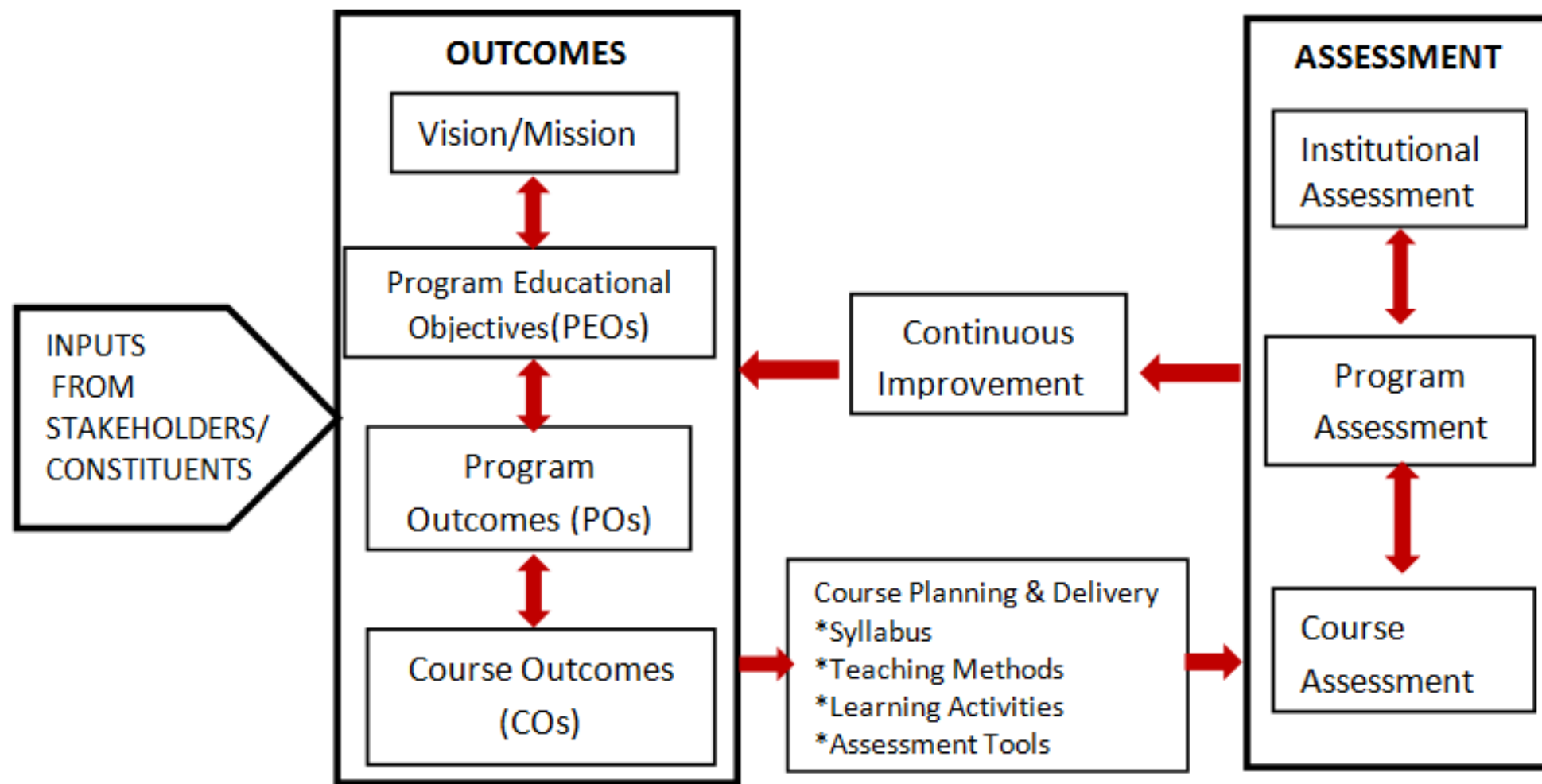
Key Parameters of Outcome Based Education



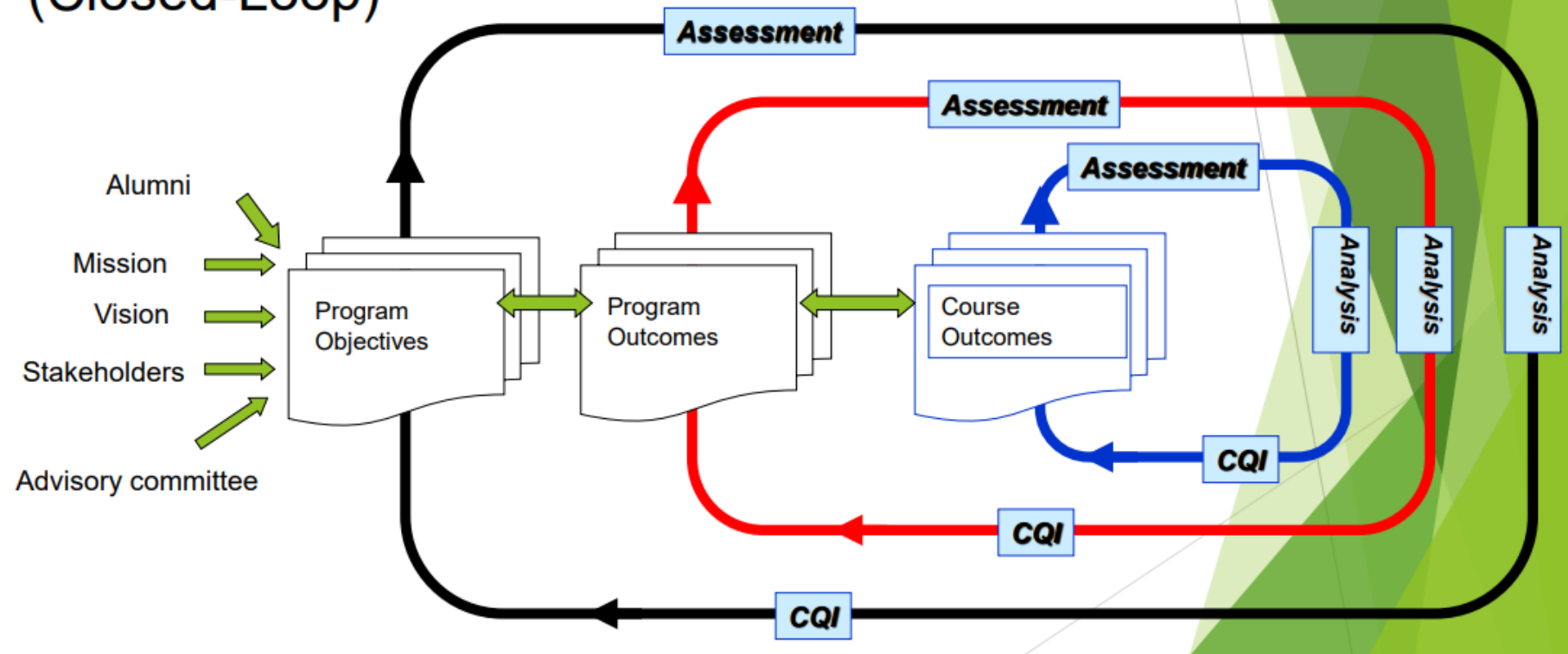
Implementation of Outcome Based Education



OBE Framework



Outcome-Based Education Implementation Model (Closed-Loop)



Programme Educational Objectives (PEOs)

Programme Educational Objectives (PEOs) are broad statements that describe the career and professional accomplishments that the programme is preparing the graduates to achieve. PEO's are measured around 4-5 years after graduation.

Program Educational Objectives (PEOs):

- a. Apply strong educational knowledge successfully in industry and pursuing advanced degrees in related fields.
- b. Use their communication skills in professional practices as well as demonstrate leadership quality through teamwork.
- c. Prove themselves as competitive professionals who will be able to solve real-life problems by analyzing and interpreting data.
- d. Exhibit the quality to be successful entrepreneurs and ethically sound professionals.

Program Outcomes

What the graduates are expected to know and able to perform or attain by the time of graduation (skills, knowledge and behaviour/attitude)

At the successful completion of 4 years for BSc in CSE programmes, the graduates of the University will be able to attain the following Graduate Attributes:

Program Outcomes

| Sl. No | PO | Category | Description |
|--------|------|---------------------------------|---|
| 1 | PO 1 | Engineering Knowledge | Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems. |
| 2 | PO 2 | Problem Analysis | Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4) |
| 3 | PO 3 | 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. (K5) |
| 4 | PO 4 | Investigation | Conduct investigations of complex problems using research-based knowledge (K8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions. |

Program Outcomes

| | | |
|------|--------------------------------|--|
| PO 5 | Modern Tool Usage | Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations. (K6) |
| PO 6 | 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 and solutions to complex engineering problems. (K7) |
| PO 7 | Environment and Sustainability | Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (K7) |
| PO 8 | Ethics | Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (K7) |

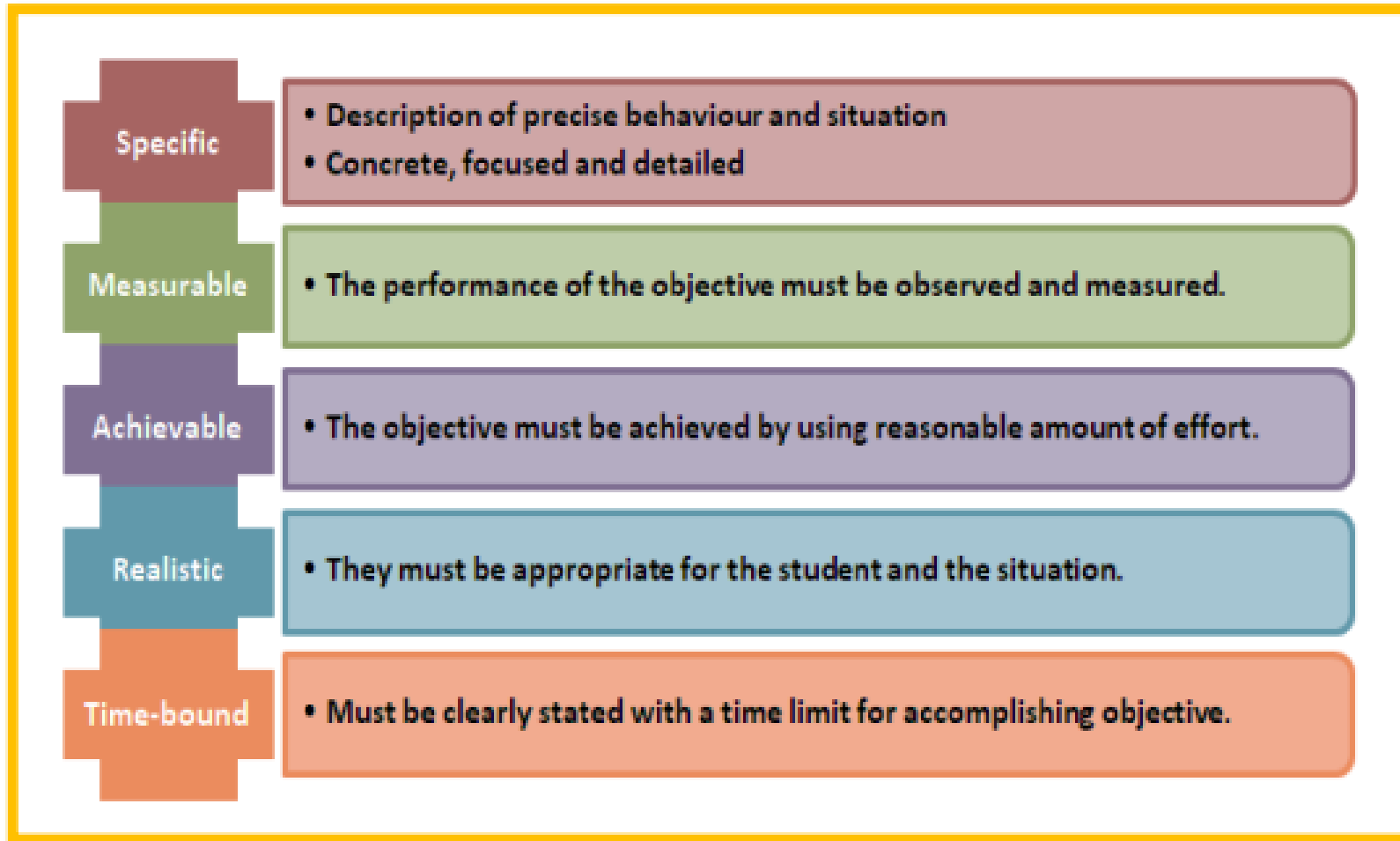
Program Outcomes

| | | | |
|----|-------|--------------------------------|---|
| 9 | PO 9 | Individual and Team Work | Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings. |
| 10 | PO 10 | 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. |
| 11 | PO 11 | Project Management and Finance | Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. |
| 12 | PO 12 | Life Long Learning | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. |

Course Outcomes

- COs are the statements of knowledge/ skills/ abilities that students are expected to know, understand and perform as a result from their learning experiences in each course.
- Each Course will have 3-5 CO
- Each CO will be mapped with 1 or more PO
- Each CO must be evaluated through assessments (CTs, Mid term, Presentation, Finals etc)
- Through marks obtained in each exam question, it will be calculated how much of the COs have each student obtained.

SMART Technique to define Learning Outcomes



Words & Phrases to **Avoid!**

WORDS TO AVOID

- *Believe*
- *Hear*
- *Realize*
- *Capacity*
- *Intelligence*
- *Recognize*
- *Comprehend*
- *Know*
- *See*
- *Conceptualize*
- *Listen*
- *Self-Actualize*
- *Memorize*
- *Think*
- *Experience*
- *Perceive*
- *Understand*
- *Feel*

PHRASES TO AVOID

Evidence a (n): To Become: To Reduce:

- *Appreciation for*
- *Acquainted with*
- *Adjusted to*
- *Awareness of*
- *Capable of*
- *Comprehension of*
- *Cognizant of*
- *Enjoyment of*
- *Conscious of*
- *Familiar with*
- *Interest in*
- *Interested in*
- *Knowledge of*
- *Knowledgeable about*
- *Understanding of*

Three Domains of Educational Learning or Activities



Cognitive

(Knowledge)

Development of
mental/intellectual
skills



(Attitude)

Manner in which we deal
with things emotionally -
feelings, values,
attitudes

Psychomotor

(Skills)

Manual or physical skills,
movement, coordination,
motor-skill

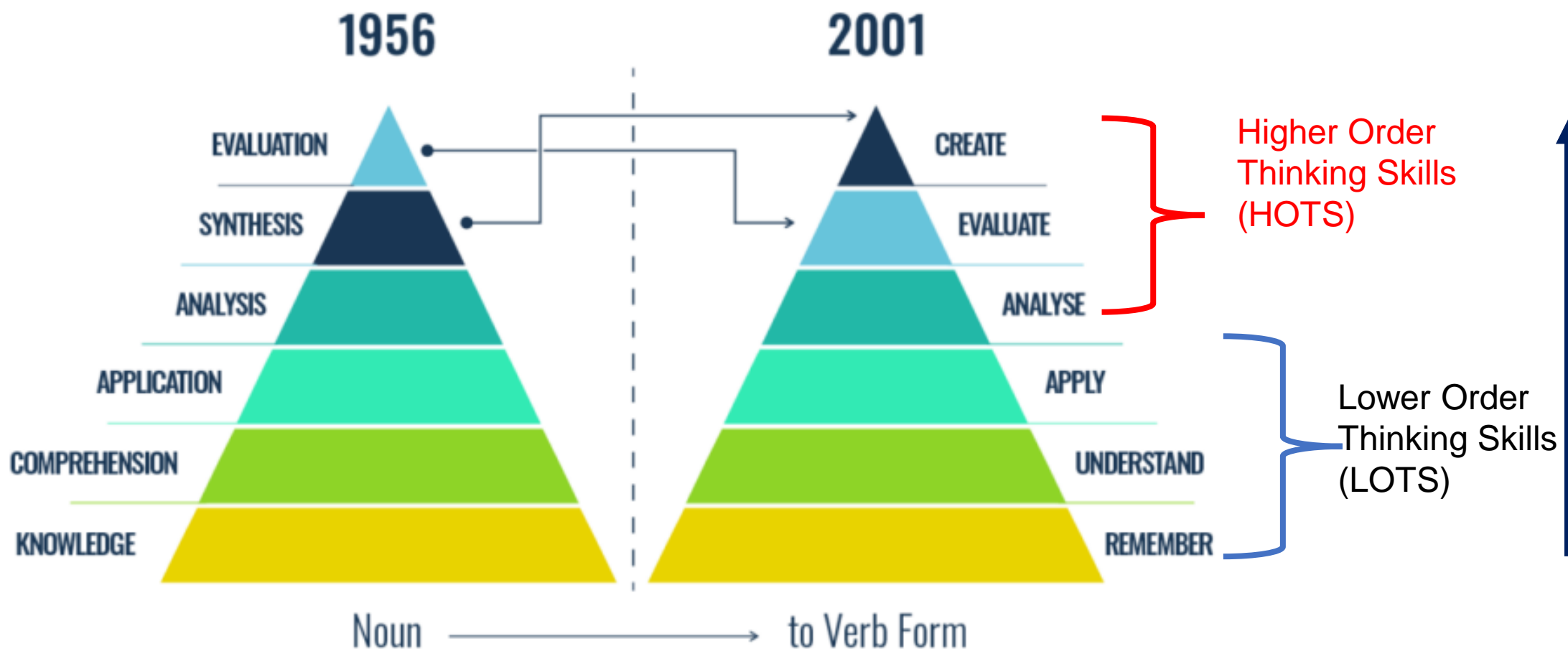


Bloom's Taxonomy

- Bloom's Taxonomy is a **hierarchical framework** for **categorizing** educational goals, objectives, and outcomes into levels of **complexity and specificity**.
- The taxonomy is divided into three domains: **cognitive**, **affective**, and **psychomotor**.
- Bloom's Taxonomy attempts to **classify learning stages from remembering facts to creating new ideas** based on the acquired knowledge.
- To promote higher forms of thinking in education

Bloom's Taxonomy – Cognitive Domains

knowledge and the development of intellectual skills



Six major categories of cognitive process, starting from the simplest to the most complex.

Remember/ Knowledge

The ability to recall facts, data, information and basic concepts.

Example: Recall the formula for Ohm's law in an electrical circuits.



KNOWLEDGE:

Define,
Identify,
Describe,
Recognize,
Tell,
Explain,
Recite,
Memorize,
Illustrate,
Quote

Understand / Comprehension

- The ability to grasp the meaning of material.
- Explain ideas or concepts

Example: Explain how Ohm's law applies to a simple circuit.

02

UNDERSTAND:

Summarize,
Interpret,
Classify,
Compare,
Contrast,
Infer,
Relate,
Extract,
Paraphrase,
Cite

Apply/ Application

- The ability to use learned material in new and concrete situations.
- Use information in new situations

Example: Use Ohm's law to calculate the current in a circuit given the voltage and resistance.

03

APPLY:

Solve,
Change,
Relate,
Complete,
Use,
Sketch,
Teach,
Articulate,
Discover,
Transfer

Analyze / Analysis

- The ability to understand the underlying structure to knowledge and also are able to distinguish between fact and opinion.
- Draw connections among ideas

Example: Analyze the differences between series and parallel circuits.



ANALYZE:

Contrast,
Connect,
Relate,
Devise,
Correlate,
Illustrate,
Distill,
Conclude,
Categorize,
Take Apart

Evaluate / Evaluation

- Make judgement about the value of ideas, items, materials, and more.
- Justify a decision or course of action

Example: Evaluate different circuit simulation software for accuracy and usability..



EVALUATE:

Criticize,
Reframe,
Judge,
Defend,
Appraise,
Value,
Prioritize,
Plan,
Grade,
Reframe

Create / Synthesis

- Produce new or original work

Example: Design and build a custom power supply that can provide multiple output voltages for different electronic devices.



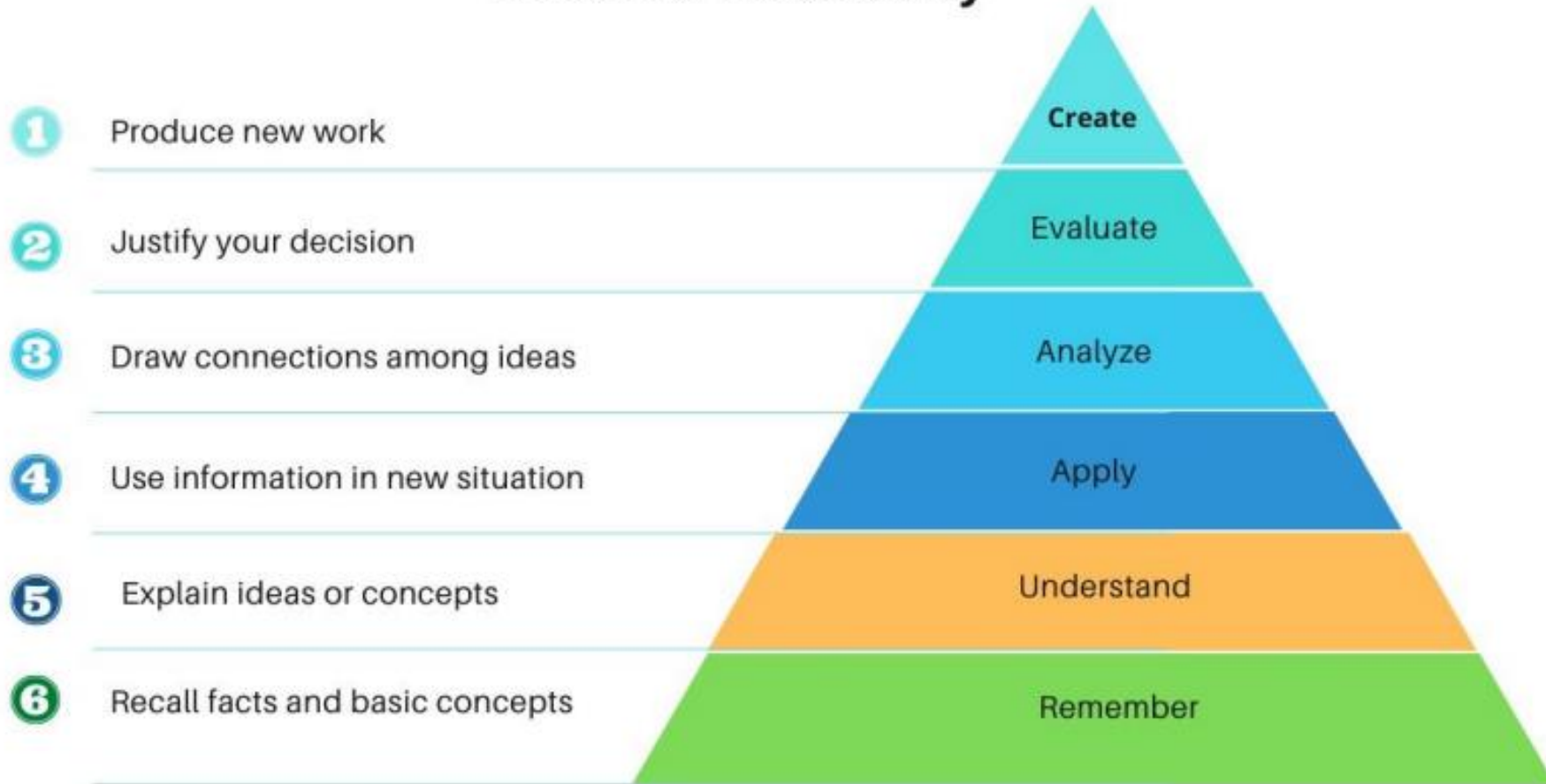
CREATE:

Design,
Modify,
Role-Play,
Develop,
Rewrite,
Pivot,
Modify,
Collaborate,
Invent,
Write



Bloom's Taxonomy with Punchline

Bloom's Taxonomy

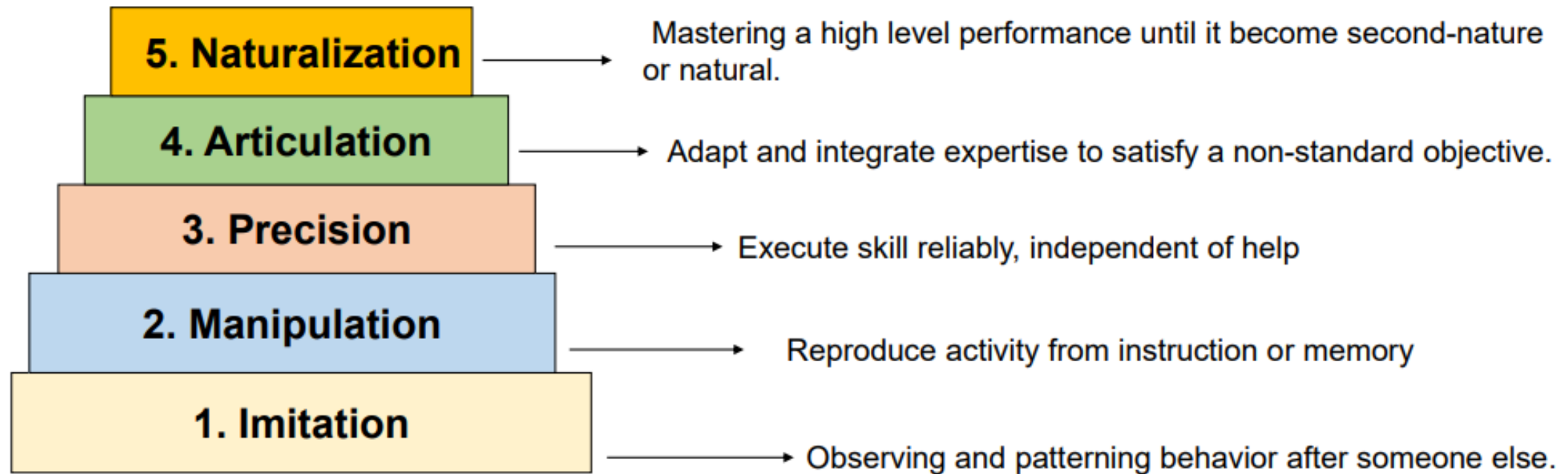


Example – Cognitive Domain

- Sarah is learning how to cook a new recipe. She reads the recipe and memorizes the ingredients and their quantities.
- Sarah moves to the next step in cooking. She reads the recipe instructions and explains why each step is necessary.
- Sarah starts cooking the recipe. She applies the steps she memorized and understood to cook the dish.
- Sarah wants to improve her dish. She analyzes the flavors and textures to identify what can be improved
- Sarah tastes her dish. She evaluates the dish based on taste, texture, and appearance.
- Sarah wants to create her own recipe. She combines her knowledge of ingredients and cooking techniques to invent a new dish.

Bloom's Taxonomy – Psychomotor Domains

- Focuses on **physical skills** and the development of motor abilities.
- Involves co-ordination of **brain and muscular activity**.



Classified by Dave (1975)

Example – Psychomotor Domain

Imitation: Observing and copying the actions of others.

A child watches an older sibling or a parent riding a bicycle. He mimics the way they get on the bike, hold the handlebars, and pedal. He gets on a bicycle with training wheels and tries to balance while pedaling slowly, imitating the movements they observed.

Manipulation: Performing actions based on instructions and practicing skills with some guidance.

The child receives instructions from a parent on how to ride the bicycle. He practices riding with assistance, following verbal cues and adjusting based on feedback. He rides the bicycle while a parent holds the seat for balance, practicing starting, stopping, and steering based on the parent's guidance.

Precision: Refining and improving performance to achieve greater accuracy and control.

The child gains confidence and starts riding without assistance. He focuses on balancing, steering, and pedaling smoothly. He rides the bicycle without training wheels, practicing smooth turns, steady pedaling, and controlled braking.




Articulation: Coordinating a series of actions smoothly and adapting skills to new situations.

The child starts riding the bicycle in different environments, such as parks and streets. He adjusts to different terrains and coordinates actions like signaling turns and avoiding obstacles. He rides the bicycle on a park trail, navigating curves, slopes, and other cyclists, while signaling turns and stopping safely.

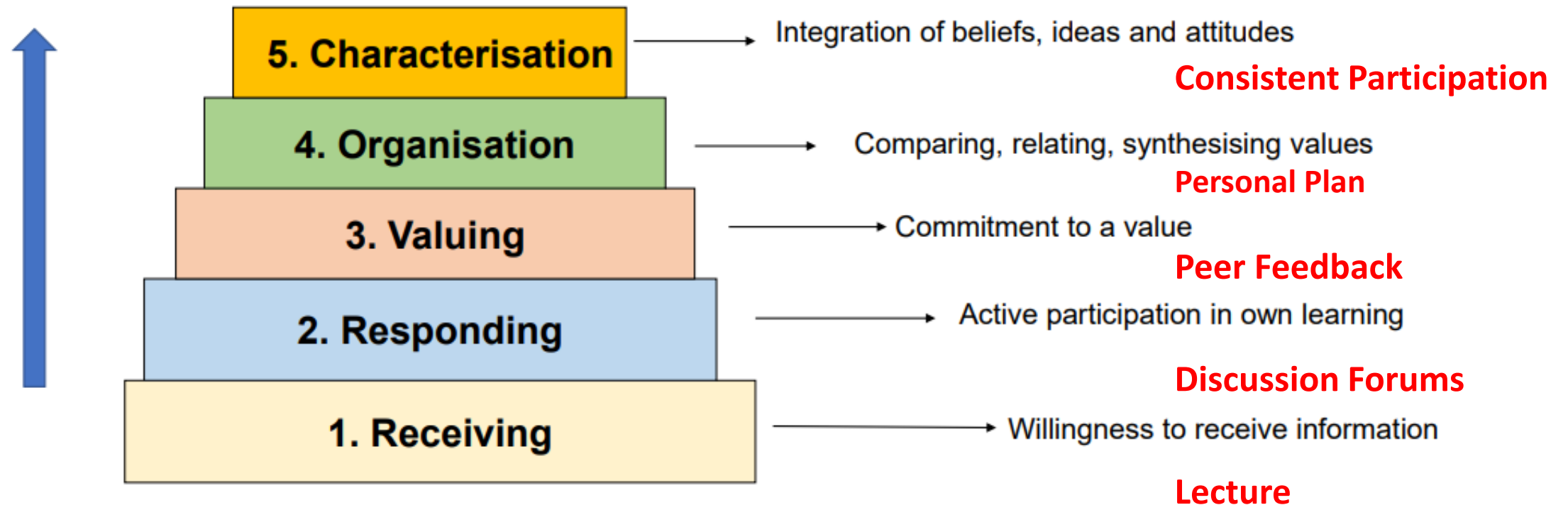
Naturalization: Performing skills automatically and effortlessly without conscious thought.

The child rides the bicycle as a natural part of their daily activities. He rides confidently without thinking about balance or coordination. He rides the bicycle to school or around the neighborhood, navigating traffic and obstacles effortlessly, with riding becoming second nature.

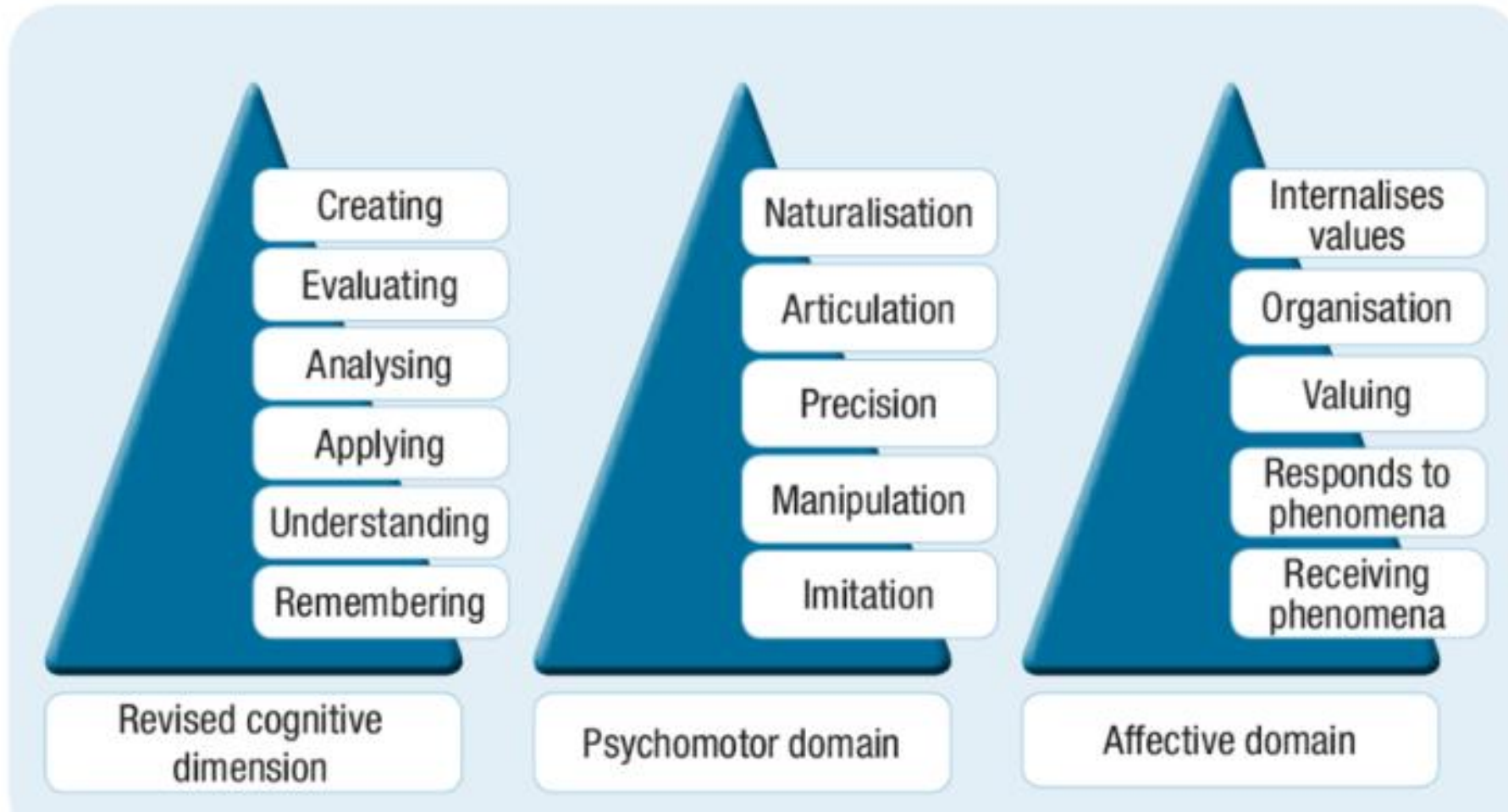


Bloom's Taxonomy – Affective Domains

the manner in which we deal with things **emotionally**, such as **feelings, values, appreciation, enthusiasms, motivations, and attitudes**.



Bloom's Taxonomy





THANK YOU