

Outcome *B*ased *E*ducation

(Learning Taxonomy & GS)

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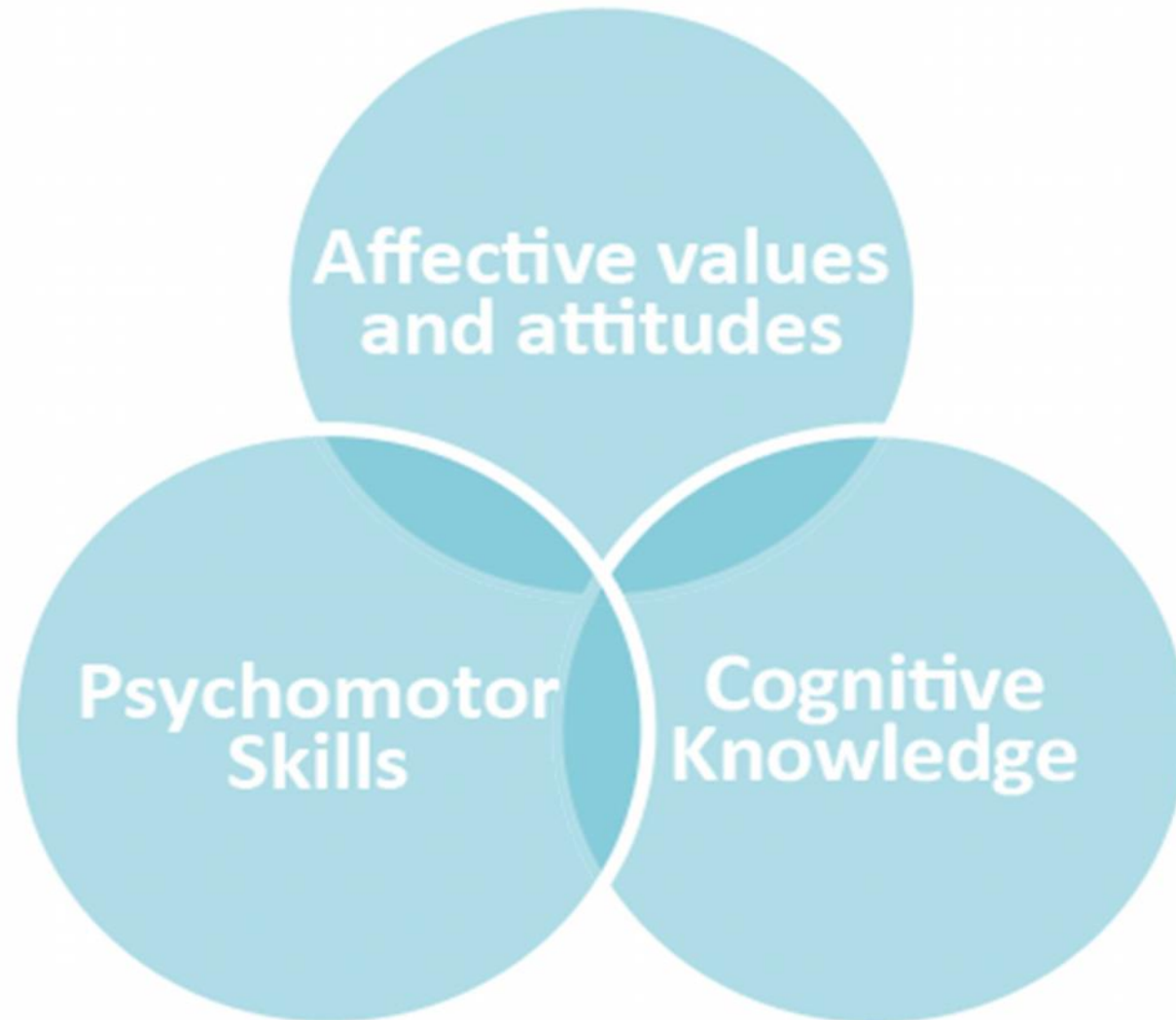
INTRODUCTION

Developed by **Dr. Benjamin S Bloom** and Published in 1956 (Taxonomy of Educational Objectives)

Focus on 'mastery' of subjects and the promotion of higher forms of thinking, rather than fact transfer and information recall

Covering all human aspects – knowledge and intellect (*Cognitive Domain*); attitude and beliefs (*Affective Domain*); and the ability to put physical and bodily skills into effect (*Psychomotor Domain*)

Learning Taxonomy



Basic Definition

Taxonomy means 'a set of classification principles', or 'structure'

Domain simply means 'category' or 'Area'

Bloom's Taxonomy underpins the classical 'Knowledge, Attitude, Skills' structure of learning method and evaluation

Basic Definition

1. **Cognitive** domain (*intellectual capability, i.e., knowledge, or 'think'*)
2. **Affective** domain (*feelings, emotions and behaviour, i.e., attitude, or 'feel'*)
3. **Psychomotor** domain (*manual and physical skills, ie., skills, or 'do'*)

Brief Overview

Bloom's Taxonomy has therefore since 1956 provided a basis for ideas which have been **used (and developed) around the world by academics, educators, teachers and trainers**, for the preparation of learning evaluation materials, and also provided the platform for the complete 'Bloom's Taxonomy' (including the detail for the third 'Psychomotor Domain') as we see it today. Collectively these concepts which make up the whole Bloom Taxonomy continue to be **useful and very relevant to the planning and design of: school, college and university education, adult and corporate training courses, teaching and lesson plans, and learning materials**; they also serve as a template for the evaluation of: training, teaching, learning and development, within every aspect of education and industry.

Brief Overview

In each of the three domains Bloom's Taxonomy is based on the premise that the categories are **ordered in degree of difficulty**. An important premise of Bloom's Taxonomy is that **each category (or 'level') must be mastered before progressing to the next**. As such the categories within each domain are levels of learning development, and these levels increase in difficulty.

Brief Overview

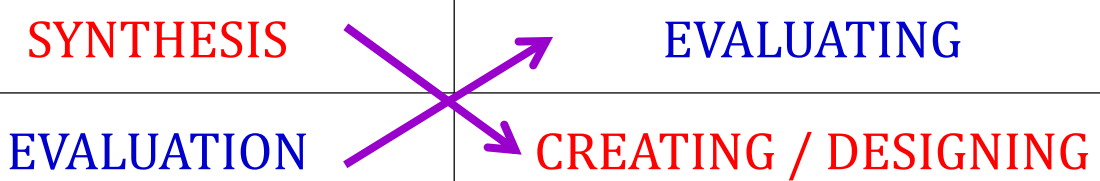
Cognitive	Affective	Psychomotor
knowledge	attitude	skills
1. Recall data	1. Receive (awareness)	1. Imitation (copy)
2. Understand	2. Respond (react)	2. Manipulation (follow instructions)
3. Apply (use)	3. Value (understand and act)	3. Develop Precision
4. Analyse (structure/elements)	4. Organise personal value system	4. Articulation (combine, integrate related skills)
5. Synthesize (create/build)	5. Internalize value system (adopt behaviour)	5. Naturalization (automate, become expert)
6. Evaluate (assess, judge in relational terms)		

COGNITIVE DOMAIN

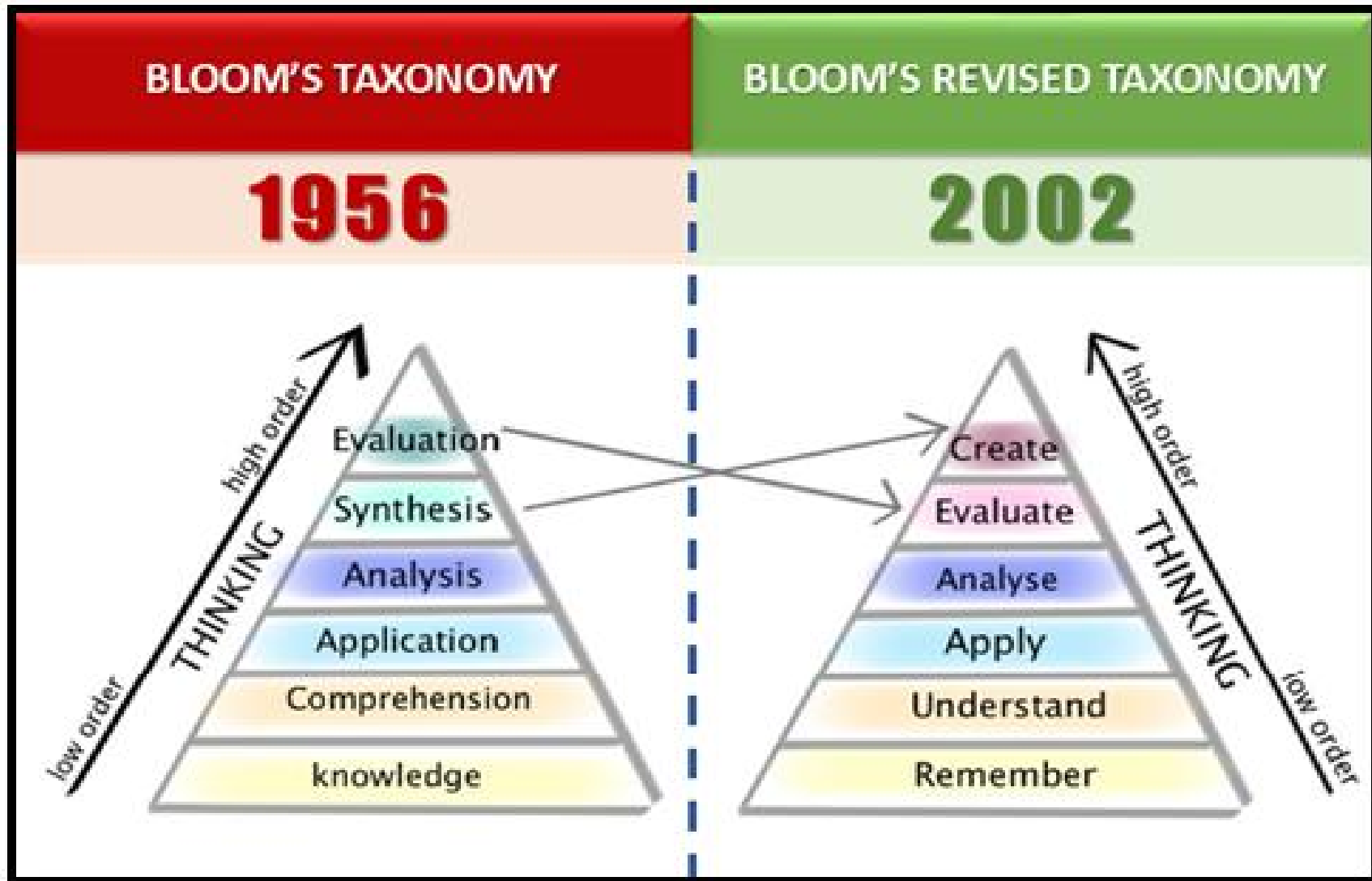
Cognitive Domain

Intellect - Knowledge - Thinking Ability

LEVEL	ORIGINAL <i>(Blooms 1956)</i>	REVISED <i>(Anderson 2001)</i>
1	KNOWLEDGE	REMEMBERING
2	COMPREHENSION	UNDERSTANDING
3	APPLICATION	APPLYING
4	ANALYSIS	ANALYSING
5	SYNTHESIS	EVALUATING
6	EVALUATION	CREATING / DESIGNING

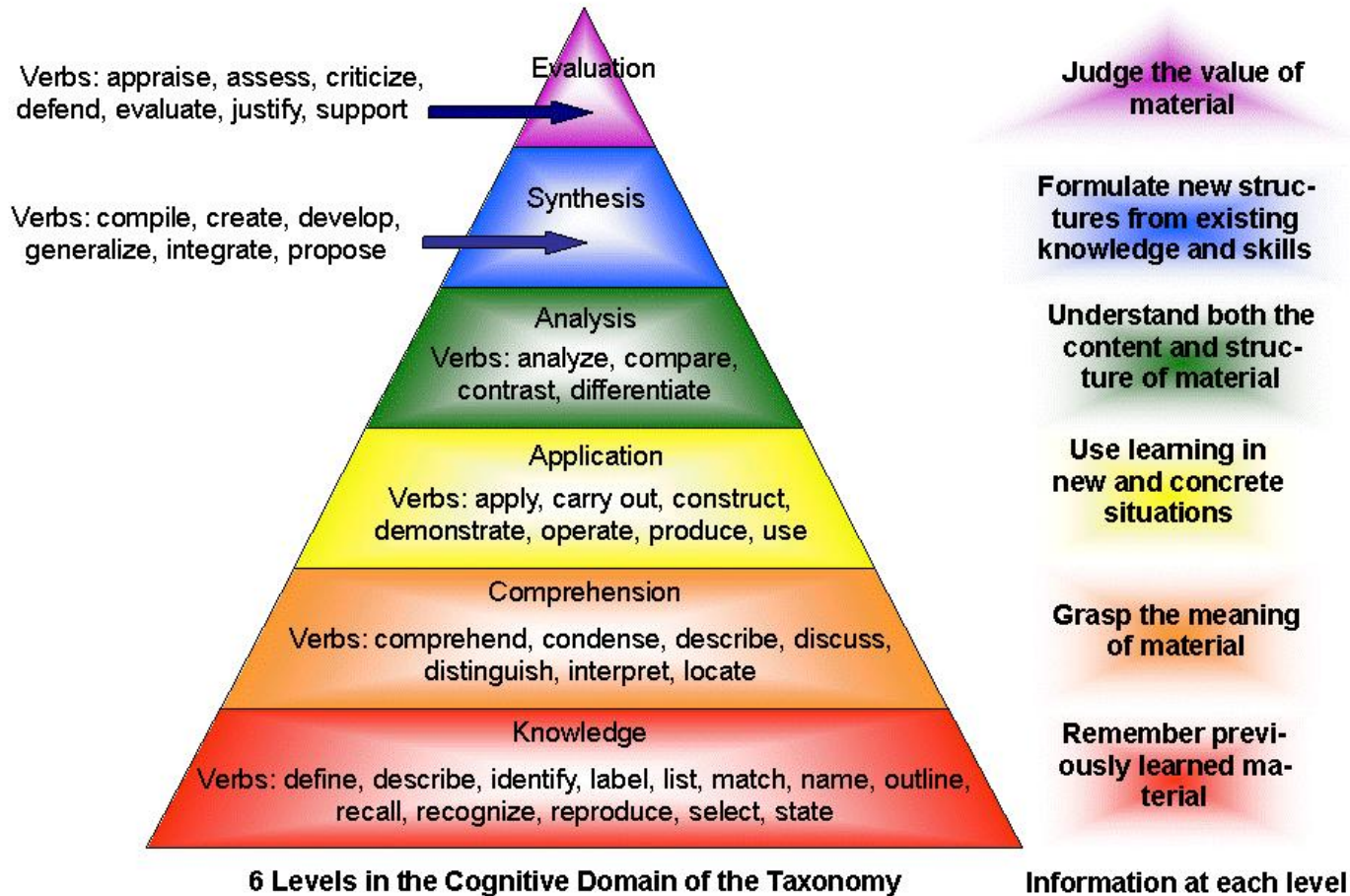


Cognitive Domain

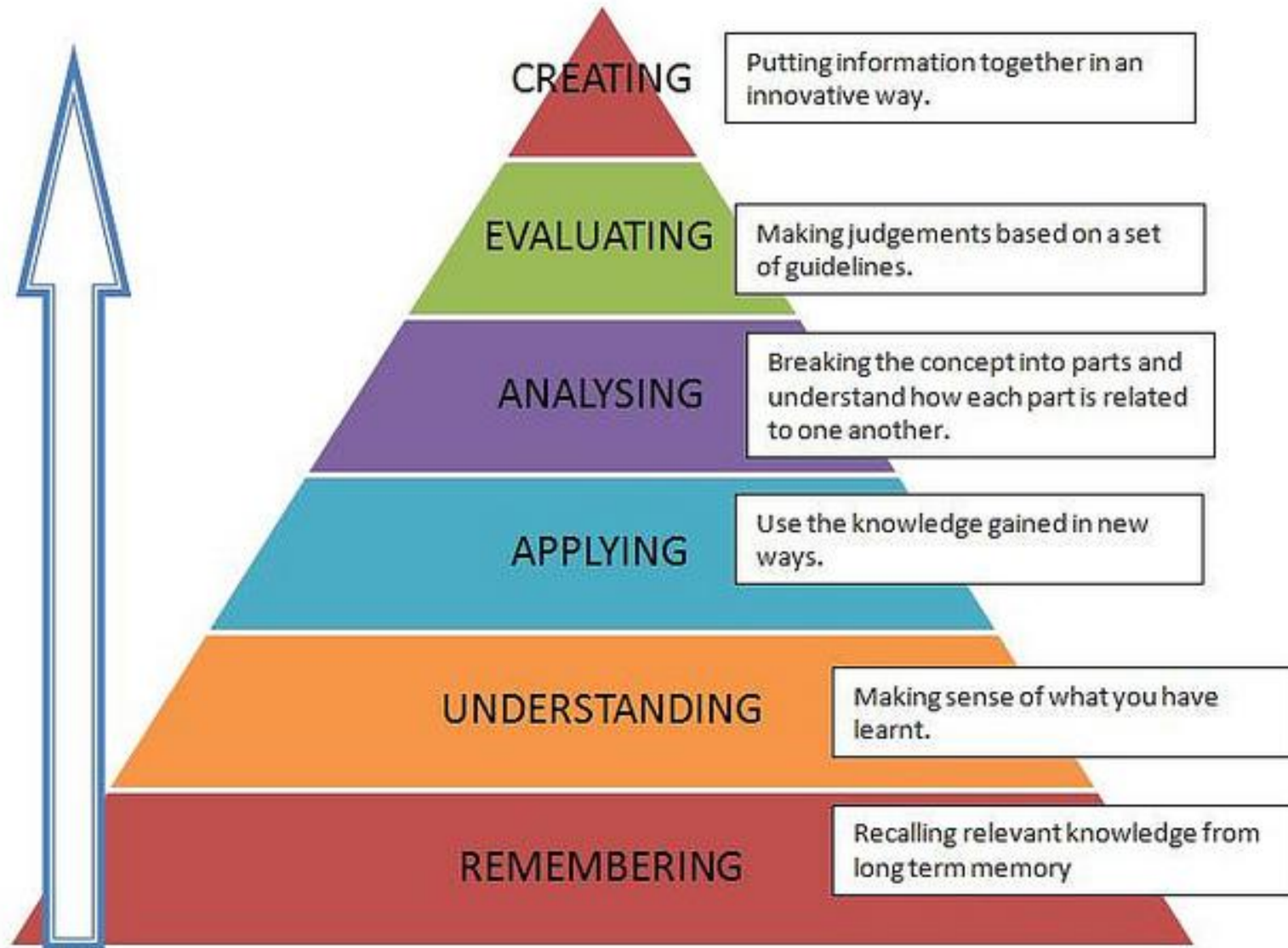


Original Blooms

Bloom's Taxonomy



Revised Blooms



Cognitive Domain

COGNITIVE DOMAIN				
level	category or 'level'	behaviour descriptions	examples of activity to be trained, or demonstration and evidence to be measured	'key words' (verbs which describe the activity to be trained or measured at each level)
1	Knowledge (REMEMBERING)	recall or recognise information	multiple-choice test, recount facts or statistics, recall a process, rules, definitions; quote	arrange, define, describe, label, list, memorise, recognise, relate, reproduce,
			law or procedure	select, state
2	Comprehension (UNDERSTANDING)	understand meaning, re-state data in one's own words, interpret, extrapolate, translate	explain or interpret meaning from a given scenario or statement, suggest treatment, reaction or solution to given problem, create examples or metaphors	explain, reiterate, reword, critique, classify, summarise, illustrate, translate, review, report, discuss, re-write, estimate, interpret, theorise, paraphrase, reference, example

Cognitive Domain

3	Application (APPLYING)	use or apply knowledge, put theory into practice, use knowledge in response to real circumstances	put a theory into practical effect, demonstrate, solve a problem, manage an activity	use, apply, discover, manage, execute, solve, produce, implement, construct, change, prepare, conduct, perform, react, respond, role-play
4	Analysis (ANALYSING)	interpret elements, organizational principles, structure, construction, internal relationships; quality, reliability of individual components	identify constituent parts and functions of a process or concept, or de-construct a methodology or process, making qualitative assessment of elements, relationships, values and effects; measure	analyse, break down, catalogue, compare, quantify, measure, test, examine, experiment, relate, graph, diagram, plot, extrapolate, value, divide
			requirements or needs	
5 (6)	Synthesis (create/build) (CREATING / DESIGNING)	develop new unique structures, systems, models, approaches, ideas; creative thinking, operations	develop plans or procedures, design solutions, integrate methods, resources, ideas, parts; create teams or new approaches, write protocols or contingencies	develop, plan, build, create, design, organise, revise, formulate, propose, establish, assemble, integrate, re-arrange, modify

Cognitive Domain

6 (5)

Evaluation
(EVALUATING)

assess effectiveness of whole concepts, in relation to values, outputs, efficacy, viability; critical thinking, strategic comparison and review; judgement relating to external criteria

review strategic options or plans in terms of efficacy, return on investment or cost-effectiveness, practicability; assess sustainability; perform a SWOT analysis in relation to alternatives; produce a financial justification for a proposition or venture, calculate the effects of a plan or strategy; perform a detailed and costed risk analysis with recommendations and justifications

review, justify, assess, present a case for, defend, report on, investigate, direct, appraise, argue, project-manage

See Poster

Cognitive Domain

LEVEL	DESCRIPTION	EXAMPLE 1 (Cartoon Character)
1	REMEMBERING	List down (as many as you wish) cartoon characters that you watch on TV
2	UNDERSTANDING	Select one cartoon character that you like most and describe its character. Use sketch if necessary
3	APPLYING	Explain how these characters can help you in real life
4	ANALYSING	Choose three cartoon character that you like most and study the similarities, differences, strengths and weakness
5	EVALUATING	Out of three above, which one (in your opinion) is the best character and explain the reasons behind your selection
6	CREATING / DESIGNING	Based on the cartoon characters that you have watched, create a new cartoon character (sketch) and describe its features and main characters

Cognitive Domain

LEVEL	DESCRIPTION	EXAMPLE 2 (Shipyards Location and Layout)
1	REMEMBERING	List down five characteristics for selecting shipyard location / Three characteristics of a good shipyard layout
2	UNDERSTANDING	Briefly explain one of the characteristics listed above. Use sketch if necessary
3	APPLYING	Based on the characteristics of shipyard location above, prepare a survey work to be carried out on the selected location
4	ANALYSING	Based on the data collected from several potential locations, analyse the strength and weaknesses of each location.
5	EVALUATING	Based on the analysis above, make your judgment on which location to be selected
6	CREATING / DESIGNING	Based on the characteristics of a good shipyard layout, and the given piece of land (map), propose a suitable layout for a medium size steel ship.

Cognitive Domain

LEVEL	DESCRIPTION	EXAMPLE 3 (Large Ange Stability)
1	REMEMBERING	State correctly the definition of ship stability / State the different between Initial Stability and Large angle stability of a ship / Write down the formula for calculating large angle stability
2	UNDERSTANDING	Using simple lay man language, explain the concept of righting moment to a non naval architect / non technical manager / ship owner
3	APPLYING	Based on the given ship data , calculate the righting arm value (GZ) up to 90 degree heel using one of the method discussed in class and plot the curve.
4	ANALYSING	Repeat the above calculation for other anticipated loading conditions of the ship. Analyze the graphs plotted.
5	EVALUATING	Evaluate / assess the stability of the ship based on the IMO stability criteria for all loading conditions
6	CREATING / DESIGNING	Propose improvement that can be performed either on the main dimension of the ship, hull form or general arrangement of the ship in order to improve the stability.

AFFECTIVE DOMAIN

Affective Domain

Feeling, Emotions, Attitude, Beliefs

First developed by Bloom (1956), revised by Bloom, Krathwhol and Masia (1964)

LEVEL	DESCRIPTION	BEHAVIOUR
1	RECEIVE	AWARENESS
2	RESPOND	REACT
3	VALUE	UNDERSTAND & ACT
4	ORGANIZE	DEVELOP VALUE SYSTEM
5	INTERNALIZE	BEHAVE CONSISTENTLY

Affective Domain

AFFECTIVE DOMAIN

level	category 'level' or	behaviour descriptions	examples of experience, or demonstration and evidence to be measured	'key words' (verbs which describe the activity to be trained or measured at each level)
1	Receive	open to experience, willing to hear	listen to teacher or trainer, take interest in session or learning experience, take notes, turn up, make time for learning experience, participate passively	ask, listen, focus, attend, take part, discuss, acknowledge, hear, be open to, retain, follow, concentrate, read, do, feel
2	Respond	react and participate actively	participate actively in group discussion, active participation in activity, interest in outcomes,	react, respond, seek clarification, interpret, clarify, provide other references and examples, contribute,
			enthusiasm for action, question and probe ideas, suggest interpretation	question, present, cite, become animated or excited, help team, write, perform

Affective Domain

3	Value	attach values and express personal opinions	decide worth and relevance of ideas, experiences; accept or commit to particular stance or action	argue, challenge, debate, refute, confront, justify, persuade, criticise,
4	Organise or Conceptualize values	reconcile internal conflicts; develop value system	qualify and quantify personal views, state personal position and reasons, state beliefs	build, develop, formulate, defend, modify, relate, prioritise, reconcile, contrast, arrange, compare
5	Internalize or characterise values	adopt belief system and philosophy	self-reliant; behave consistently with personal value set	act, display, influence, solve, practice,

Affective Domain

LEVEL	DESCRIPTION	EXAMPLE 1 (Punctuality)
1	RECEIVE	Listen / get to know the class rules on punctual attendance. Willing to adhere to the rules / aware of the consequences
2	RESPOND	Willing to discuss & encourage others to observe punctuality
3	VALUE	Attach value on action - Attend class punctually most of the time
4	ORGANIZE	Able to extend / develop punctuality in other aspect of life (not only class attendance)
5	INTERNALIZE	Always consistent / punctual on other aspect of life (Second nature)

Affective Domain

LEVEL	DESCRIPTION	EXAMPLE 2 (Safety Practice - in Lab)
1	RECEIVE	Listen / read / get to know the class rules and regulation on lab safety . Willing to adhere to or take seriously the safety regulation. Take the necessary preparation to adhere to the safety requirements / aware of the consequences
2	RESPOND	Encourage and help others to follow safety rules / able to discuss/stand firm on the importance of safety with others
3	VALUE	Wear the necessary safety attire, follow the instruction / safety procedure during the lab experiment. Use the appropriate tools
4	ORGANIZE	Able to extend / develop safety awareness in other premises or aspect of life
5	INTERNALIZE	Always consistent / adhere to safety standard on all aspects/ Able to develop or improve safety practices

Affective Domain

LEVEL	DESCRIPTION	EXAMPLE 3 (Sustainability element - in Design)
1	RECEIVE	Read / get to know the definition, theory, requirement, concept of sustainability (life cycle). Willing to consider the sustainability aspect In design work.
2	RESPOND	Put qualitative/quantitative value on sustainability aspect in the design of product or system. Willing to share, Encourage and help others to inculcate sustainability
3	VALUE	Apply sustainability in design work. Analyze the sustainability of the product being designed.
4	ORGANIZE	Able to formulate / develop sustainability aspect in design procedure
5	INTERNALIZE	Always include sustainability aspect in any design work

PSYCHOMOTOR DOMAIN

Psychomotor Domain

Physical - Skills – Hands on - 'Do'

Was **established to address skills development** relating to manual tasks and physical movement (*Sport, Dance, Martial Art etc*)

However it also concerns and covers modern day **business and social skills** such as *communications and operation IT equipment*, for example *telephone and keyboard skills, or public speaking*.

Thus, 'motor' skills extend beyond the originally manual and physical skills, so always consider using this domain, even if you think your environment is covered adequately by the Cognitive and Affective Domains. Whatever the training situation, it is likely that the **Psychomotor Domain is significant**.

Psychomotor Domain

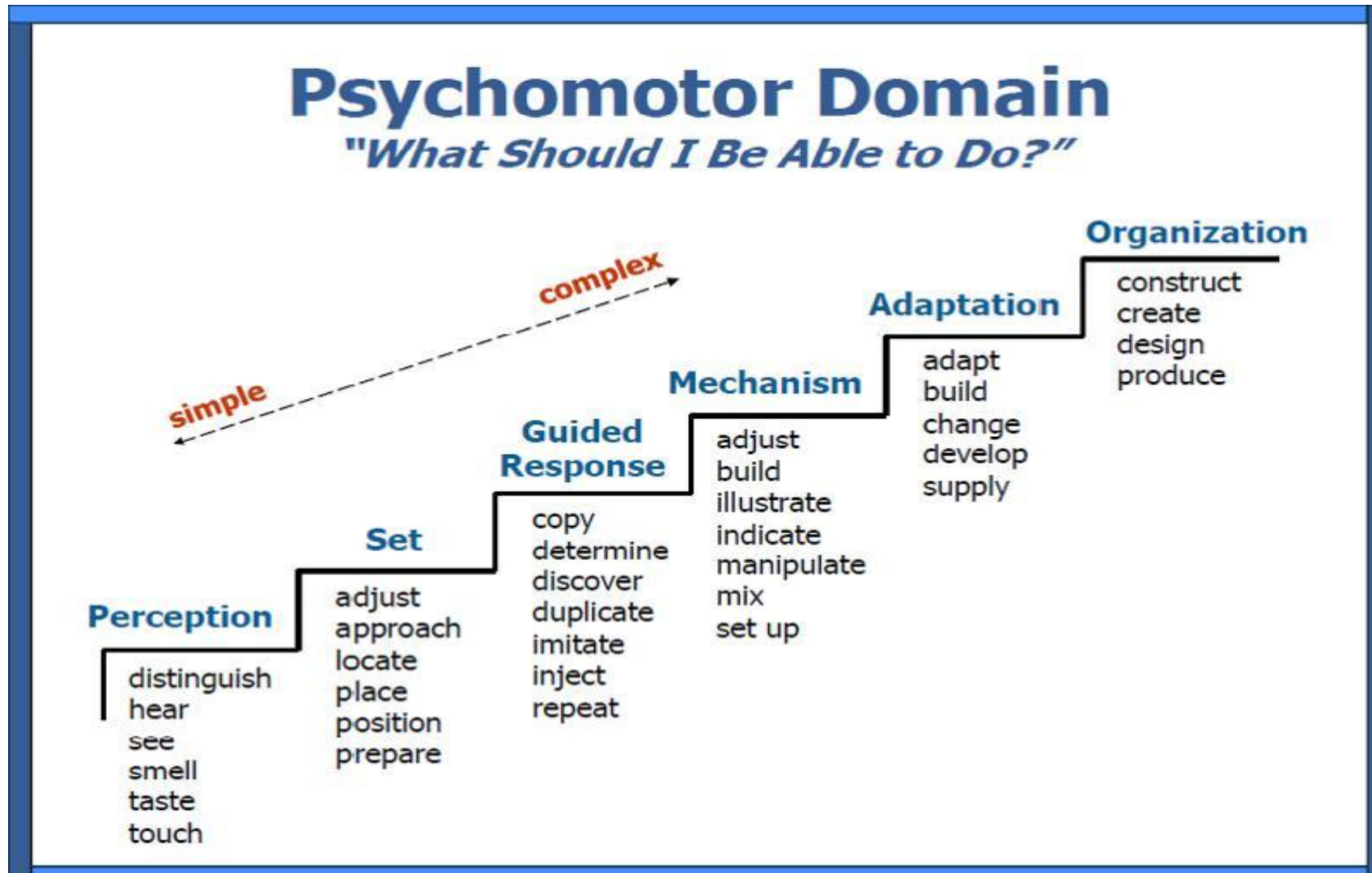
LEVEL	DAVE <i>(1967 - 1970)</i>	SIMPSON <i>(1966 - 1972)</i>	HARROW <i>(1972)</i>
1	IMITATION	PERCEPTION	REFLEX MOVEMENTS
2	MANIPULATION	SET	BASIC MOVEMENTS
3	PRECISION	GUIDED RESPONSE	PERCEPTUAL ABILITIES
4	ARTICULATION	MECHANISM	PHYSICAL ABILITIES
5	NATURALIZATION	COMPLEX OVERT RESPONSE	SKILLED MOVEMENTS
6		ADAPTATION	NON-DISCURSIVE COMMUNICATION
7		ORINATION	

Psychomotor Domain

SIMPSON

LEVEL	DESCRIPTION	BEHAVIOUR
1	PERCEPTION	AWARENESS
2	SET	READINESS
3	GUIDED RESPONSE	ATTEMPT
4	MECHANISM	BASIC PROFICIENCY
5	COMPLEX OVERT RESPONSE	EXPERT PROFICIENCY
6	ADAPTATION	ADAPTABLE PROFICIENCY
7	ORINATION	CREATIVE PROFICIENCY

Psychomotor Domain



Psychomotor Domain

PSYCHOMOTOR DOMAIN (SIMPSON)

level	category or 'level'	description	examples of activity or demonstration and evidence to be measured	'key words' (verbs which describe the activity to be trained or measured at each level)
1	Perception	awareness	use and/or selection of senses to absorb data for guiding movement	recognise, distinguish, notice, touch, hear, feel, etc
2	Set	readiness	mental, physical or emotional preparation before experience or task	arrange, prepare, get set
3	Guided Response	attempt	imitate or follow instruction, trial and error	imitate, copy, follow, try

Psychomotor Domain

4	Mechanism	basic proficiency	competently respond to stimulus for action	make, perform, shape, complete
5	Complex Overt Response	expert proficiency	execute a complex process with expertise	coordinate, fix, demonstrate
6	Adaptation	adaptable proficiency	alter response to reliably meet varying challenges	adjust, integrate, solve
7	Origination	creative proficiency	develop and execute new integrated responses and activities	design, formulate, modify, re-design, trouble-shoot

Psychomotor Domain

LEVEL	DESCRIPTION	EXAMPLE 1 (Swimming)
1	PERCEPTION	Attend swimming class, search for swimming methods, watch demonstration etc/
2	SET	Prepare swimming attire, perform warming up exercise, take the necessary supplement etc. Get prepared for swimming session
3	GUIDED RESPONSE	Jump to the water and start following the instruction from the swimming instructor
4	MECHANISM	Able to practice basic swimming stroke independently, remain afloat
5	COMPLEX OVERT RESPONSE	Able to perform various swimming strokes
6	ADAPTATION	Able to swim in difficult situation, various water conditions and able to rescue others,
7	ORINATION	Able to develop / create or improve swimming method or procedures

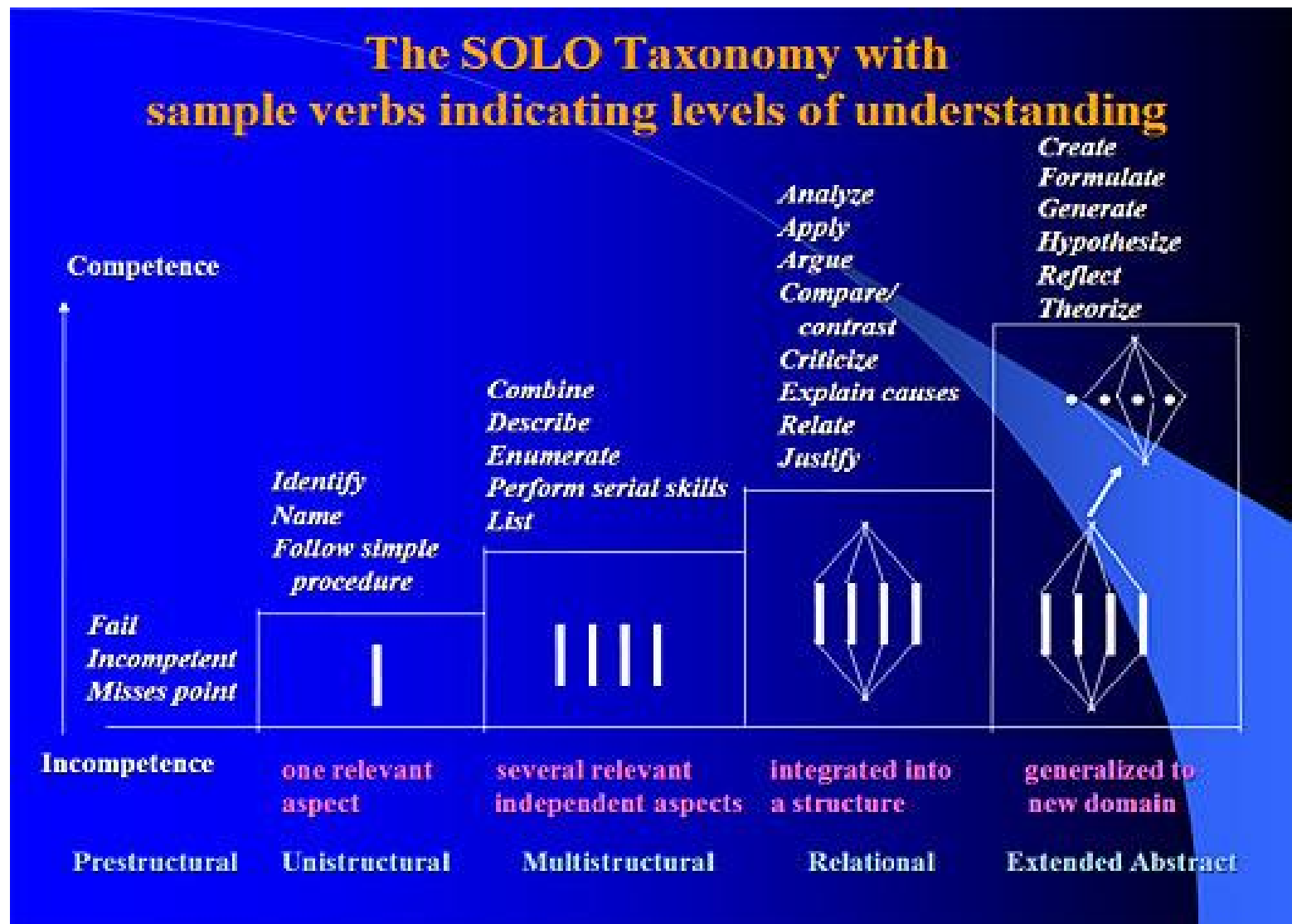
Psychomotor Domain

LEVEL	DESCRIPTION	EXAMPLE 2 (Lab Work)
1	PERCEPTION	Knowing the lab procedure
2	SET	Get the necessary information / theory / lab sheet / materials etc before attending the lab work
3	GUIDED RESPONSE	Perform lab work based on the manual or guidelines given or guided by the technicians
4	MECHANISM	Able to perform the simple lab work without supervision
5	COMPLEX OVERT RESPONSE	Able to carry out difficult lab work efficiently
6	ADAPTATION	Able to undertake any experiment work (in other fields) independently
7	ORINATION	Able to design, develop, formulate experiment procedure (and rig) that is able to collect the required data or perform the desired analysis

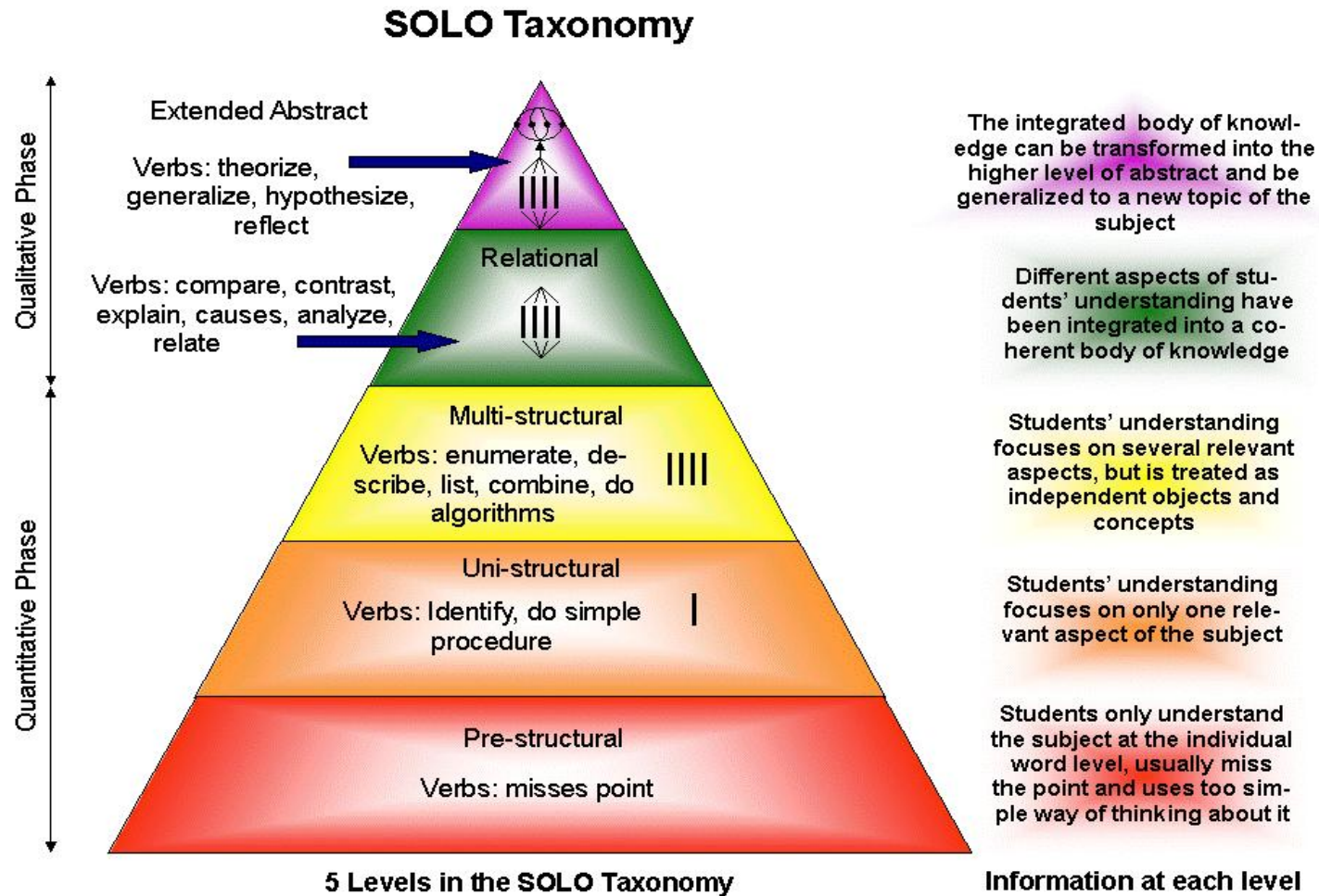
Psychomotor Domain

LEVEL	DESCRIPTION	EXAMPLE 3 (Statics / Dynamics - drawing Free Body Diagram)
1	PERCEPTION	Know / aware of the necessary knowledge on how to draw the free body diagram (FBD) correctly
2	SET	Mentally ready to draw the FBD whenever needed
3	GUIDED RESPONSE	Able to draw FBD with proper guidance from lecturer
4	MECHANISM	Able to draw Simple FBD independently
5	COMPLEX OVERT RESPONSE	Able to draw FBD of a difficult or complex system accurately
6	ADAPTATION	Able to extend / apply knowledge on FBD in other fields or in real life situation
7	ORINATION	Able to develop alternative method to draw FBD that capable to represent any system effectively

SOLO Taxonomy



SOLO Taxonomy



About Generic Skills



GS – Elements (MoHE)

COMMUNICATION SKILLS (CS)		CRITICAL THINKING & PROBLEM SOLVING SKILLS (CTPS)	
CS 1	Discuss Ideas Orally and in Writing	CTPS 1	Problem Identification
CS 2	Listening & Responding Skills	CTPS 2	Thinking Skills (Explain, Analyse, Evaluate)
CS 3	Presentation Skills	CTPS 3	Seeking Alternative Ideas
CS 4	Use Technology	CTPS 4	Thinking outside the box
CS 5	Discussion and Negotiation Skills	CTPS 5	Making Decision based on strong facts and evidences
CS 6	Communicating across cultural	CTPS 6	Stands Firm on the given responsibility
CS 7	Develop others Communication Skills	CTPS 7	Adapting to new working and cultural environment
CS 8	Non Verbal / Body Language		
TEAM WORKING SKILLS (TS)		LIFE LONG LEARNING & INFORMATION MANAGEMENT SKILLS (LL)	
TS 1	Interact and communicate with others	LL 1	Seek and Manage relevant information
TS 2	Taking roles as Leader and Member	LL 2	Accept new ideas & self learning
TS 3	Knowing and Respecting Others	LL 3	Passion for knowledge
TS 4	Contribute to the team planning and outputs		
TS 5	Responsible to Team Decision		

GS – Elements (MoHE)

ENTREPRENEURSHIP SKILLS (KK)		PROFESSIONAL ETHICS (EM)	
KK 1	Identify Bussiness Opportunity	EM 1	Understanding Economic, Environment and Social Impact
KK 2	Prepare Bussiness Plan	EM 2	Analyse and Make Decision in solving ethical problem
KK 3	Develop, explore Bussiness Opportunity	EM 3	Observing Ethical practices and responsible to the society
KK 4	Self Employed		

LEADERSHIP SKILLS (LS)	
LS 1	Knowing basic leadership skills theory
LS 2	Able to Lead Project
LS 3	Taking different roles as Leader and Member
LS 4	Coordinate team members

UTM's Graduate Attributes