Outcome Based Education Policy Document

I. Definition of Outcome Based Education -

Focussing and organizing every aspect of Educational System around what is essential for students to be able to do successfully at the end of their learning experiences.

Keys for Outcome Based Education are –

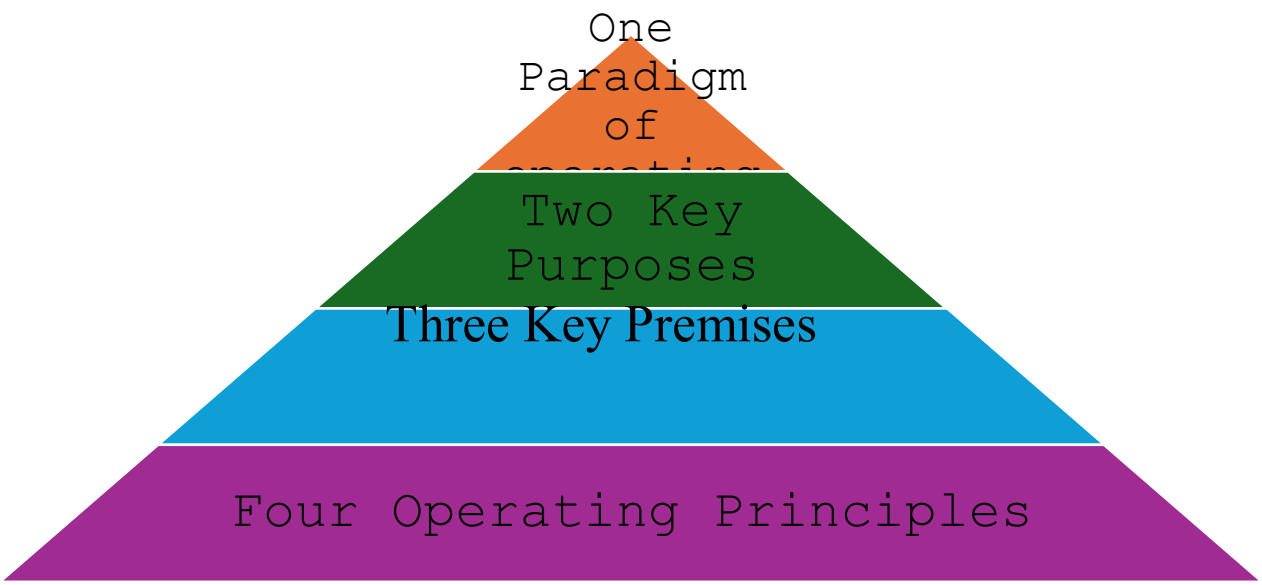
i. Developing a clear set of Learning Outcomes around which all the components of the Educational System are focused
ii. Establishing the conditions and opportunities within the Educational System that enable and encourage the students to achieve those outcomes.

Outcomes – Outcomes are not values, beliefs, attitudes or psychological states of mind. Outcomes are what learners actually do with what they know. That means outcomes are actions and performances that reflect learner competence.

Since outcomes involve actual doing, they must be defined as per the actions or demonstrations sought. Hence while defining and developing outcomes, educators must use observable action verbs such as describe, explain, design or produce etc.

The outcomes occur at the end of a learning experience. They can be thought of as representing demonstrable results that can be sought from learning. The notion of outcome is realized at the end of a Course, as a Course Outcome (CO) and when the notion is applied at the end of the Undergraduate Program, it is realized as Program Outcome (PO) and Program Specific Outcome (PSO)

The key elements to facilitate learning success for students can be summarized using OBE pyramid.



II. Details –

One Paradigm of operating – Paradigm is a way of viewing and a way of doing things consistent with that viewpoint. The paradigm of operating in OBE is making 'accomplishing results' more important than simply 'providing services'. The implicit fact in this paradigm is that ALL students should emerge from the system as genuine successful learners.

Two Key Purposes – The two key purposes are –

i. ensuring that all students are equipped with the knowledge, competence and qualities needed to be successful after they exit from the educational system.
ii. Structuring and operating Institutes so that these outcomes can be achieved and maximized for all the students.

Three Key Premises – The three key premises and assumptions are –

i. All students can learn and succeed, but not on the same day and not in the same way.
ii. Successful learning promotes more successful learning.
iii. Institutes control the conditions that directly affect successful learning.

Four Operating Principles – These principles of decision making and action are the heart of OBE. These principles are –

i. Clarity of Focus
ii. Expanded Opportunity
iii. High Expectations
iv. Design down approach

The clarity of focus - helps the educators establish a clear picture of the learning, they want the students to exhibit as a performance demonstration. This becomes their highest priority for instructional planning and student assessment. It aims at realizing the 'No Surprise' Policy of OBE, so that from day one, the students and teachers work as partners towards achieving visible and clear goals. However, it does not mean that one uniform program of study would be pursued at the same time in the same way. The same set of outcomes can be pursued using a variety of approaches and methods. This is very vital given the fact that different students have different learning rates and learning styles.

Expanded opportunity – It requires faculty to give students more than one chance to learn important things and to demonstrate those learnings. However, it does not mean that students can take as long as they want to learn something or to complete their work. Abnormal or unapproved delays in learning and completion of work has its own consequences. Those consequences are reflected in the grade obtained by the student.

High Expectations – Increasing the level of challenge to which the students are exposed and raising the standard of acceptable performance they must reach, to be called successful.

Design Down approach - Means that the faculty begin their curriculum and instructional planning, where they want the students to end up and build back from there. In other words, the Program Outcomes and Program Specific Outcomes are the targeted demonstrable entities and the design down approach initiates planning, keeping those in mind. While following this approach, if some curricular components are peripheral and optional, they may need to be replaced with more essential contents.

III. Summary –

The salient features of OBE are –

i. Learning results and performance expectations are clearly defined ahead of time.
ii. Learners know what they are expected to learn and instructors know how to help them to learn.
iii. There are no surprises in what is to be learnt and what will be assessed.
iv. Since learning is clearly defined and instruction takes the learner's experience, learning style and learning rate into consideration, almost anyone can learn anything that is truly essential for success and well-being.
v. Outcomes are ties with accomplishments and academic performance.
vi. Curriculum development focuses on where the learners are desired to end up at the time of graduation.

vii. Advancement in learning is tied with actual levels of successful performance and not to a fixed schedule.

The advantages of OBE are –

i. Purpose and Direction – OBE gives a clearer purpose and direction of academic growth because of its strategic design.
ii. Consistency – Clear rationale ensures that there is more consistency in policy making. The pyramidal structure ensures that decision making and action in terms of realization of short term and long-term goals is consistent.
iii. Increased motivation and morale – Increased student motivation and morale as well as faculty effectiveness and positive mindset. Results in shift in organizational climate, shared sense of responsibility and improved relationships.
iv. Improved Stakeholder relationship – Direct involvement of stakeholders such as Industry, Academia, Parents, Alumni, Regulating Authority. Closer ties result in mutually reinforcing benefits such as strengthened bidirectional communication and confidence building.
v. Cost effectiveness – OBE in its planning and implementation does not result in additional costs. The budgetary and monitory provisions mostly remain unchanged.

IV. Vision and Mission Statement –

- These are the strategic public declarations of the Program. The vision statement defines the purpose of the program and mission statements outline the means to realize the vision and translate it into reality.
- Vision and mission statements keep the program on track by creating the bridge between the department and various stakeholders, guiding the decision-making process for resource allocation, policy information and progressive improvement.

V. Program Outcomes (PO)–

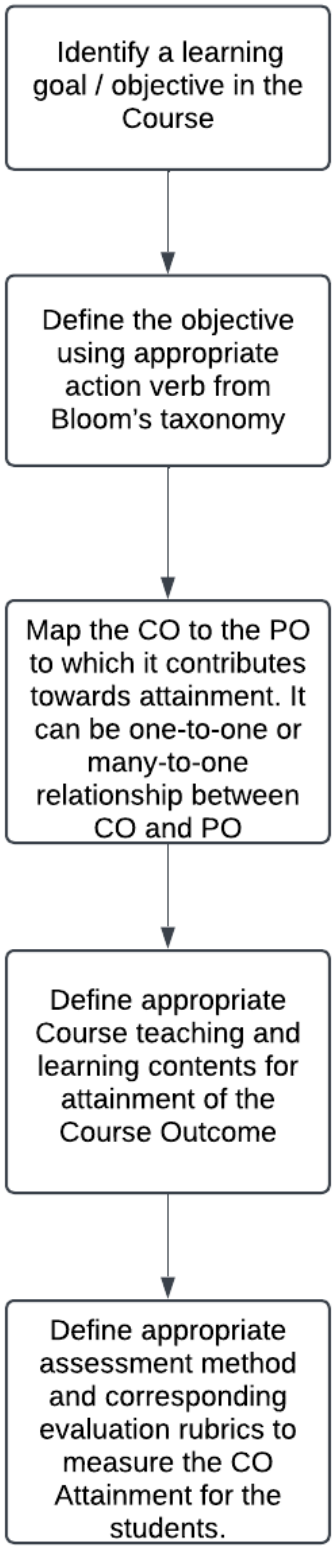
- These are the statements that describe what the students are expected to know and be able to do by the time of graduation. PO statements relate to the knowledge, skills and attitudes the students acquire progressively during the course of the program. The Program curriculum and courses are designed and executed accordingly, so that the students have acquired an acceptable level of knowledge, skills and behavioural traits at the time of graduation, as outlined by Program Outcomes.
- Besides the Program Outcomes, Program Specific Outcomes (PSO) are also designed. These Program Specific statements describe what specific knowledge,

skills and attitudes the graduates of the program should additionally demonstrate besides those outlined by generic Program Outcomes.

VI. Course Outcomes (CO) –

- At course level, the OBE processes define several key activities that define restructuring of each Course Curriculum, defining COs, their mapping with Pos, defining teaching-learning methods, ascertaining appropriate evaluation and assessment tools and detailed reporting practices for all of these aspects.
- Each Course in the curriculum has a set of Course Outcomes which depict the level of Engineering knowledge and skills, students are able to acquire upon successful completion of the Course. COs are strategically planned as per the characteristics of the Course, its relative position in the Program's Academic structure and the graduation requirement of the specialization of Engineering.
- COs within the course define what students would be able to know and be able to do after completion of the Course. Each Course has multiple COs.
- Each of the COs are appropriately defined using action verbs chosen from the revised Bloom's Taxonomy. This taxonomy is a framework of action verbs for classifying statements of what the students are expected to learn. These appropriately chose action verbs define what the students must learn and demonstrate within the scope of the CO. These action verbs help align the CO definition to that of a PO, with which it is mapped.
- The CO must have a strong or partial correlation with one or more than one POs. This correlation is indicated by means of ordinal references ranging from 3 for strong correlation up to 1 indicating the relatively weakest correlation. Ideally this alignment should be one-to-one or many-to-one and effectively given the large number of Courses, and hence the COs, develops into a one -to-many from CO to PO.
- The CO definition activities are carried out by the respective course faculty group, being experts in the subject matter. The faculty are adequately trained on establishing Course Outcomes by exploiting Bloom's taxonomy of action verbs and associating them with the appropriate Program Outcomes and/or Program Specific Outcomes.

A step-by-step approach to defining Course Outcomes developed using Design – down basis is as shown below –


Identify a learning goal / objective in the Course
Define the objective using appropriate action verb from Bloom's taxonomy
Map the CO to the PO to which it contributes towards attainment. It can be one-to-one or many-to-one relationship between CO and PO
Define appropriate Course teaching and learning contents for attainment of the Course Outcome
Define appropriate assessment method and corresponding evaluation rubrics to measure the CO Attainment for the students.

The following guidelines are followed for developing course content –

a. Define the knowledge content that are core to the comprehensive teaching and learning of the COs
b. Course content should be adequately detailed to understand what exactly is being taught and learnt
c. Course content should be organized across weekly teaching hours and in terms of various segments of engagement, such as theory class, laboratory session, supplemental tutorial sessions etc. the association between the weekly content and CO is explicitly drawn.
d. Documentation of appropriate teaching methods such as theory class, laboratory session, supplemental tutorial sessions and diverse evaluation methods that are employed such as Written examination, Quiz, Viva, Seminar, Group Discussion, projects should be documented.

VII. Assessment and Attainment –

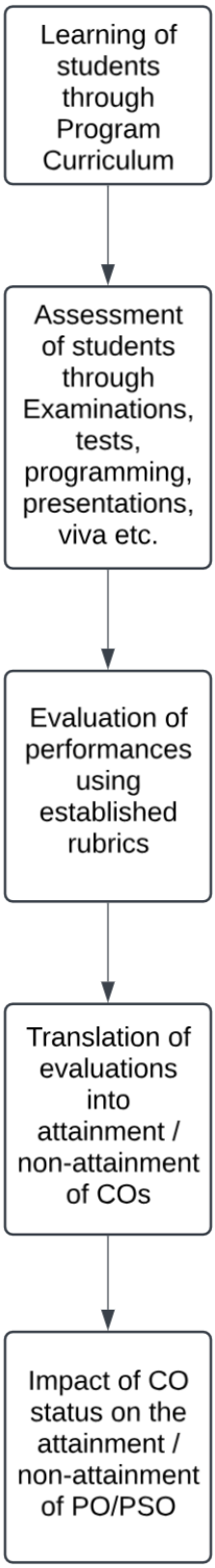
Teaching process in OBE is aimed at assisting the students to comprehensively learn the subject matter in order to demonstrate the achievement of Course Outcomes, both as an individual student and as a cohort group.

Direct methods of assessment and thereby the attainment is accomplished through explicit evaluation of students' knowledge and skills against measurable performance indicators or rubrics. The assessment is formulated in such a way that it reflects as closely as possible to the actual tasks that the students would face in the professional life.

Direct assessment is carried out using various assessment tools such as examinations, class tests, assignments, quizzes, project work, presentations, reports, blogs, viva, programming exams, laboratory work, performance in internship etc. Course Outcomes are assessed using more than one appropriately designed modes of assessment. Assessments are evaluated on the basis of well-defined rubrics.

The scores of all assessments associated with a CO collectively contribute towards the attainment of the CO, which in turn feeds into the assessment and attainment of the linked PO/PSO.

The sequence from student learning through to Assessment and Attainment is as shown below.


Learning of students through Program Curriculum
Assessment of students through Examinations, tests, programming, presentations, viva etc.
Evaluation of performances using established rubrics
Translation of evaluations into attainment / non-attainment of COs
Impact of CO status on the attainment / non-attainment of PO/PSO

VIII. Continuous Quality Improvement process (CQI)–

- This is a formal process initiated by the Institute to audit and improve the quality of program offerings.
- This process improvement cycle uses quality indicators.
- The CQI process tracks and compiles the OBE process parameters to assess the compliance of the academic practices as per the OBE mandate.
- The CQI process includes mechanism of obtaining feedback from students, graduates, parents, industry etc.
- The outcomes of these assessments are evaluated, shortcomings if any are found out and are used for improvement planning of the program during the next iteration.
- For example, the attainment or non-attainment of COs and in extreme cases non-attainment of Pos as well are integrated for improvements in the course outlines for the upcoming Semester.

OBE process execution through CQI – Internal Quality Control

Category	Scope	Method	Improvement level	Area of Improvement
Student Feedback	Awareness about OBE, CO,PO,PSO	Survey	Course Level	CO
	Course Content			Course Content
	Delivery of Content			Teaching Methods
	Assessment of COs			Assessment Methods
Board of Studies	CO design and Academic Challenge Level	Meetings and Interaction	Program Level	CO
	PSO design; CO to PO/ PSO linkages			Linkages
	Modes of Assessments			Assessment Methods
	Inclusion and Exclusion of Courses			Internal and External Stakeholder inputs

Category	Scope	Method	Improvement level	Area of Improvement
Exit Feedback	Feedback on Learning	Survey	Program Level	PO
				Student Counselling

	Feedback on Assessment			Teacher Training
	Feedback on Faculty role			
	Feedback on resource and facilities			
	Feedback on Admin support			
	Indirect PO attainment			
OBE Process statistics	CO Attainment – Course level	ERP, Excel, Visualization tools	Program level	Academic Practices
	PO Attainment – Program level			
	Student Performance			
	Grading Distribution – Course and Program level			
OBE Process Analytics	Prediction on CO Attainment – Course level	Visualization and Prediction tools, Analytics packages	Process level	Academic and Administrative practices
	Suggestions of CO / PO improvement			
	Comparative Analysis			

OBE process execution through CQI – External Quality Control

Category	**Scope**	**Method**	**Improvement level**	**Area of Improvement**
Industry Advisory Board	Teaching-Learning Process	Meetings of IAB	Course Level	CO
	Curriculum Development			Course Content

	Industry Needs			Teaching Methods
	Internships			Assessment Methods
	Audit Courses			
Parents	Teaching-Learning Process	Meeting with Parents	Program Level	CO
	Curriculum Development			Course Content
	Internship, Placement, Higher Studies Opportunities			PO
Alumni	Curriculum development	Meetings with Alumni	Program Level	Curricular Aspects
	Industry Needs			New Course Development
	Internships			Internship opportunities
	Audit Courses			New Course Development
	Laboratory Development			Industry Interaction
NBA	Institutional Structure	SAR	Program Level	CO
	Academic Processes and Practices	Institute Visit	Process Level	PO
	OBE implementation	Stakeholder Meetings		Academic Practices
	Research Initiatives			Policy Making
	Governance			
	Admin Support			

Category	Scope	Method	Improvement level	Area of Improvement
Society	Technological Changes	Interaction with stakeholders	Process Level	Academic Practices
	Industry Needs			Admin Practices
	Social Needs			Policy Making

IX. Implementation of OBE in ……. Program

Vision Statement of the Institute

Mission Statements of the Institute

Vision Statement of the Department

Mission Statements of the Department (say3)

Program Educational Objectives (PEO) of the Department (say3)

Mapping between the PEOs and Mission Statements

	Mission Statement 1	Mission Statement 2	Mission Statement 3
PEO 1	□		□
PEO 2		□	□
PEO 3	□	□	

PO/PSO and PEO Mapping

	PEO1	PEO2	PEO3
PO1	□		
PO2		□	□
PO3	□	□	
PO4			□
PO5	□	□	
PO6	□		
PO7			□
PO8		□	
PO9		□	
PO10			□
PO11	□	□	
PO12		□	□
PSO1	□		□
PSO2	□	□	
PSO3	□		□

X. Course wise CO-PO Mapping

Sample Course Name:

Course Code:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2	PSO3
CO1	3		1		2						2			3	
CO2		2	2			3		2				3	1		1
CO3	2			3						2			1	3	
CO4	2	2	3		2						3				1
CO5		3		3		3				2			1		1
CO6	1		3									1		3	

Assessment and Evaluation Details:

Sample Course Name:

Course Code:

Assessment Type	Assessment Tools	% Marks	COs Assessed	Total
Continuous Formative	Laboratory	10		16
	Presentation/ Group Discussion/ Home Assignment/ Blog	6		
Summative	Course Project	20		84
	End Sem. Exam	30		
	Viva	20		
	Presentation/ Group Discussion/ Home Assignment/ Blog	14		

XI. CO Attainment

The Course Owner in consultation with the Course faculty decides an Academic Challenge Level (ACL) for all identified Course outcomes. In Accordance with that the CO attainment logic is established as follows

Academic Challenge Level (ACL)	CO Attainment Condition
1	At least 75% students to get ≥ 50% Marks offered for that CO
2	At least 70% students to get ≥ 50% Marks offered for that CO
3	At least 65% students to get ≥ 50% Marks offered for that CO
4	At least 60% students to get ≥ 50% Marks offered for that CO
5	At least 55% students to get ≥ 50% Marks offered for that CO

Sample Calculations:

Consider the course – ET 2271- Digital Systems

CO 1 – ACL :3

In- Semester Assessment						
Name	PPT_ ACT	PPT_ CONV	LAB_ ACT	LAB_ CONV	MSE_ ACT	MSE_ CONV
Garje Vedang	75	15	8	8	12	4
Shirude Aditya	70.6	14.12	6.67	6.67	22.5	7.5
Anushka Thombare	69.5	13.9	6.67	6.67	21	7
Agnibha Sarkar	74.6	14.92	7.33	7.33	25.5	8.5
Kalyani Laddha	75	15	9	9	22.5	7.5
Aditya Jannawar	72.1	14.42	6.67	6.67	18	6

And so on.

End- Semester Assessment								
Name	CVV_ ACT	CVV_ CONV	CP_ ACT	CP_ CONV	ESE_ ACT	ESE_ CONV	HA_ ACT	HA_ CONV
Garje Vedang	70	14	7	7	25	10	75	7.5
Shirude Aditya	50	10	6	6	24	9.6	70	7
Anushka Thombare	65	13	6	6	24	9.6	80	8
Agnibha Sarkar	70	14	7	7	23	9.2	70	7
Kalyani Laddha	80	16	7.5	7.5	42	33.6	75	7.5
Aditya Jannawar	45	9	6.5	6.5	21	8.2	70	7

And so on.

The shaded cells indicate that the student has scored less than 50% Marks in the Assessment Head.

PARAMETER	CVV_ ACT	CP_ ACT	ESE_ ACT	HA_ ACT	PPT_ ACT	LAB_ ACT	MSE_ ACT

# STUDENTS WITH > 50% MARKS	117	122	69	122	122	117	121
TOTAL STUDENTS	124	124	124	124	124	124	124
PERCENTAGE	94.39	98.39	55.65	98.39	98.39	94.35	97.58
WEIGHTAGE OUT OF 100 MARKS	20	10	20	10	20	10	10
% CO ATTAINMENT (C)	88.548						

As per ACL 3 norm, since % CO Attainment is > 65% CO 1 is attained.

Iterative Calculations of CO Attainment Percentages

1. If Course outcome is NOT ATTAINED in Earlier AY (n-1)
   Retain the same attainment level as target for AY (n)

   i.e. $COA_n = COA_{n-1}$

2. If Course outcome is ATTAINED in Earlier AY (n-1)
   Use the iterative calculation formula

   I. $COA_n \% = COA_{n-1} \% +$ (# COs attained for the Course in A.Y. (n-1) / # COs for the Course in AY (n-1)) * 3
   and
   II. $COA_n \% = COA_{n-1} \%$ for $COA_{n-1} \geq 90\%$

CO-PO Mapping for ET 2271 is as shown –

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	0	0	0	0	0	1	1	0	1	1	1

XII. PO Attainment

The threshold level for PO Attainment is kept at 80%.

80% weightage is given to Direct PO Attainment and 20% weightage is given to Indirect PO Attainment

Direct Attainment of PO:

For PO1, many such COs across different courses would have a Strong (3), Moderate (2), Little (1) or No (0) correlation.

Summation of ALL such correlations for PO1 is 398 = N say.

Partial Contribution P of CO1 for ET 2271 with a correlation weightage of 2, say 'w' is

= (w/N) * C

i.e. P = (2/398) * 88.548 = 0.4427

Such partial contributions for all COs that are correlated with PO1 are calculated to obtain Direct PO Attainment value for PO1.

In the given Case study, the value is 89.86 %

Indirect Attainment of PO:

For obtaining the Indirect Attainment of PO, following tools are used –

a. Student Exit Feedback
b. Alumni Feedback
c. Employer Feedback

Departments to attach applicable feedback questionnaire

By using suitable assessment rubrics for the feedback questionnaire, (Departments to elaborate) indirect PO attainment score is calculated.

In the given Case study, the value is 89.32 %

Hence Overall PO Attainment is –

$PO_{(Overall)} = 0.8\ PO_{(Direct)} + 0.2\ PO_{(Indirect)} = 0.8*89.86 + 0.2*89.32 = 89.76\ \%$

Since the threshold level for PO Attainment is kept at 80%

Hence PO1 is Attained.

Dr. Parikshit N. Mahalle — Dean Academics

Dr. Rajesh Jalnekar — Director

Annexure – I

Bloom's Taxonomy Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	• Choose • Define • Find • How • Label • List • Match • Name • Omit • Recall • Relate • Select • Show • Spell • Tell • What • When • Where • Which • Who • Why	• Classify • Compare • Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Choose • Construct • Develop • Experiment with • Identify • Interview • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • Function • Inference • Inspect • List • Motive • Relationships • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Award • Choose • Compare • Conclude • Criteria • Criticize • Decide • Deduct • Defend • Determine • Disprove • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Judge • Justify • Mark • Measure • Opinion • Perceive • Prioritize • Prove • Rate • Recommend • Rule on • Select • Support • Value	• Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Happen • Imagine • Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan • Predict • Propose • Solution • Solve • Suppose • Test • Theory