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OUTCOME BASED EDUCATION MANUAL

Academic Year: 2023-2024

Preface

This manual is a reference to the faculty of Sree Guru Govind Singh Tricentenary University, Gurugram, Haryana to understand the Outcome Based Education Framework provided by University Grant Commission. The manual outlines the process of developing an Outcome Based Education Curriculum and implement the process in delivering the course content. It provides a valuable guideline to create and map Course Outcome, Program Outcome and Program Specific Outcome and implement the assessment methods and its attainment.

TABLE OF CONTENT

1. OUTCOME BASED EDUCATION (OBE) – AN OVERVIEW

Outcome-based education (OBE) is an education model that emphasise on a clearly articulated idea of what students are expected to know and be able to do at the end of their programme of study. OBE involves the restructuring of curriculum, assessment and setting outcomes for the achievement of higher order learning and mastery rather than accumulation of course credits and scores. The OBE focuses on the mapping and measuring students' performance through outcomes at every stage of their learning. The ultimate aim of OBE is to allow Higher Education Institution for flexibility and innovation in (i) programme design and syllabi development (ii) teaching-learning process, (iii) assessment of student learning levels, and (iv) periodic programme review within a broad framework of agreed expected graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes.

Definitions

Some important aspects of the Outcome Based Education -

a) **Course:** A Course is defined as a theory, practical or theory cum practical subject studied in a semester. For e.g. Computer Applications Management

b) **Course Outcome (CO):** Course outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Outcomes may be specified for each course based on its weightage.

c) **Program:** A Program is defined as the specialization or discipline of a Degree. It is the interconnected arrangement of courses, co-curricular and extracurricular activities to accomplish predetermined objectives leading to the awarding of a degree. For e.g.: B.Tech., MBA etc.

d) **Program Educational Objectives (PEOs)**: The program education objectives of a program are the statements that describe the expected achievements of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after graduation.

e) **Program Outcomes (POs): The** Program outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be.

f) **Program Specific Outcomes (PSO)** : The Program Specific Outcomes are what the students should be able to do at the time of graduation with reference to a specific discipline. Usually there are two to four PSOs for a Program.

g) **Graduate Attributes (GA):** The graduate attributes reflect the particular quality and feature or characteristics of an individual, including the knowledge, skills, attitudes and values that are expected to be acquired by a graduate through studies at the higher education institution (HEI) such as a college or university. The graduate attributes include capabilities that help strengthen one's abilities for widening current knowledge base and skills, gaining new knowledge and skills, undertaking future studies, performing well in a chosen career and playing a constructive role as a responsible citizen in the society. The graduate attributes define the characteristics of a student's university degree programme(s), and describe a set of characteristics/competencies that are transferable beyond study of a particular subject area and programme contexts in which they have been developed.

h) **Qualification descriptors:** A qualification descriptor indicates the generic outcomes and attributes expected for the award of a particular type of qualification (for eg. a bachelor's degree or a bachelor's degree with honours). The qualification descriptors also describe the academic standard for a specific qualification in terms of the levels of knowledge and understanding, skills and competencies and attitudes and values that the holders of the qualification are expected to attain and demonstrate.

1.1. The overall objectives of outcomes-based education framework are to:

1.1.1. help formulate graduate attributes, qualification descriptors, programme learning. outcomes and course learning outcomes that are expected to be demonstrated by the holder of a qualification;

1.1.2. enable prospective students, parents, employers and others to understand the nature and level of learning outcomes (knowledge, skills, attitudes and values) or attributes a graduate of a programme should be

capable of demonstrating on successful completion of the programme of study;

1.1.3. maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility; and

1.1.4. provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

1.2. Salient Feature of Outcome Based Education

1.2.1. *Assessment driven approach:* OBE is an assessment driven approach where the assessment criteria indicates whether a student has achieved the outcome to a satisfactory standard and what makes the difference between acceptable and unacceptable performance of the outcome.

1.2.2. *Learner Centric Approach:* OBE assessment tools are more learner centric that envisages a successful learning experience for all learners. The assessment includes formative and summative to the quality of students learning experiences by focusing on significant knowledge and skills and provide accurate estimates of current competence or potential in relation to desired outcomes to enable instructor/mentor to make appropriate decisions.

1.2.3. Criterion Referenced Approach: OBE measures the learner's achievement against a set of predetermined criteria where each module or qualification states outcomes and associated assessment criteria so that students understand in advance what they have to do to achieve these outcomes and assessors can use the criteria to assess the outcomes with reasonable objectivity reliability.

2. ABOUT SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY

SGT (Shree Guru Gobind Singh Tricentenary) University is a State Private University, situated at Budhera, Badli road, Gurugram, NCR Delhi, Haryana under the parasol of Dashmesh Educational Charitable Trust, founded in 1999. The seed of SGT, as an institution, was planted as SGT Dental College, Hospital and Research Institute in 2002, which developed to be a promising institution in Delhi-NCR and led to the growth of Faculties of Physiotherapy, Nursing and Medical Sciences. Subsequently, with the continued addition of different disciplines, the status of university was conferred on 24th January 2013 through the Haryana Private Universities (Amendment) Act No. 8 of 2013.

The founding mission for Dashmesh Educational Charitable trust was “Access to Quality” and “Education for all” propagating the message of Shree Guru Gobind Singh Ji, the great philosopher and social reformer that says, “Spread of learning is the best service to mankind”.

The University is driven by its vision and mission and has expanded its roots in 18 different disciplines in just years and continues to stride forward in the areas of medical and allied education and research to fulfil the desired objectives. The University believes in nurturing excellence in the students as well as the faculty members. The University strives to inculcate the skills and ethical behaviour in the next generation leaders for a good cultural fit along with the right academic background.

The University supports the faculty and gives ample opportunities to hone the professional and administrative skills of the faculties by making them independent and involving them in various committees and bodies to participate in the decisions and policy making process.

The university also scaled horizontally by establishing research centres like NRSC-National Reference Simulation Centre, CRC-Corporate Resource, CCSP- Centre for Cosmology Science & Popularisation, EDC Entrepreneurship Development Centre and ACIC- Atal Community Innovation Centre, Centre for Pedagogy &

Andragogy Sciences have been established for focused attention and holistic development of students, faculty members and Nation as well.

The University underwent Quality audit by QS I Gauge at the completion of 5 years in 2018 where it became the youngest University to be rated as “GOLD” Category. The University showed great promise in the areas of Teaching and Learning, Employability, Facilities and Social responsibility which resulted as rating as “DIAMOND” in 2022.

3. VISION & MISSION & CORE VALUES OF THE UNIVERSITY

Vision

“To nurture individual’s excellence through value based, cross-cultural, integrated and holistic education adopting the contemporary and advanced means blended with ethical values to contribute to building a peaceful and sustainable global civilization”.

Mission

I. To impart higher education at par with global standards that meets the changing needs of the society. To provide access to quality education and to improve quality of life, both at individual and community levels with advancing knowledge in all fields through innovations and ethical research.
II. To actively engage with and promote growth and welfare of the surrounding community through suitable extension and outreach activities.
III. To develop socially responsible citizens, fostering ethical values and compassion through participation in community engagement, extension, and promotion activities.
IV. To create a competitive and coordinated environment wherein the individual develops skills and a lifelong learning attitude to excel in their endeavours.
V. To develop Centres of Excellence culminating in achieving cutting-edge technology in all fields.

Core Values

I. Innovation
II. Leadership
III. Ethics
IV. Social responsibility

4. GUIDELINES FOR PROGRAM EDUCATION OBJECTIVES (PEOs)

The educational objectives are the statements that describe the expected achievements of graduates in their career, and in particular, what the graduates are expected to perform and achieve during the first few years after graduation whether they have got engaged in successful professional practices in their chosen discipline; demonstrated professional and personal leadership in their workspace and the society; demonstrated effective collaboration and communication in the work environment and beyond, utilized formal and informal learning opportunities to maintain and enhance technical excellence and professional growth.

The PEOs, may be guided by global and local needs, vision of the Institution, long term goals etc. For defining the PEOs the faculty members of the program must continuously work with all Stakeholders: Local Employers, Industry, Students, and the Alumni.

Here are some samples of PEOs:

PEO1: Graduate will compete on a global platform to pursue their professional career in Electrical Engineering and allied disciplines.

PEO2: Graduates will pursue higher education and/or engage in continuous up gradation of their professional skills.

PEO3: Graduate will communicate effectively and will demonstrate professional behaviour while working in diverse team.

PEO4: Graduates will demonstrate concern for society and environment.

Some of the processes, that are required to be maintained in the institution:

- Feedback format for collecting data from stakeholders.
- A process by which PEOs are created and reviewed periodically.
- A process to evaluate to what extent PEOs are attained.
- Review, Mid correction, and Continuous Quality Improvement

5. GUIDELINES FOR WRITING GRADUATE ATTRIBUTES

The graduate attributes reflect the particular quality and feature or characteristics of an individual, including the knowledge, skills, attitudes and values that are expected to be acquired by a graduate through studies at the higher education institution (HEI) such as a college or university. The graduate attributes include capabilities that help strengthen one's abilities for widening current knowledge base and skills, gaining new knowledge and skills, undertaking future studies, performing well in a chosen career and playing a constructive role as a responsible citizen in the society. The graduate attributes define the characteristics of a student's university degree programme(s) and describe a set of characteristics/competencies that are transferable beyond study of a particular subject area and programme contexts in which they have been developed. Graduate attributes are fostered through meaningful learning experiences made available through the curriculum, the total college/university experiences and a process of critical and reflective thinking.

Some of the characteristic attributes that a graduate should demonstrate are as follows:

- Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
- Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
- Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
- Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

- Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesise data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.
- Research-related skills: A sense of inquiry and capability for asking relevant/ appropriate questions, problematising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.
- Cooperation/Teamwork: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
- Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
- Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.
- Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
- Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
- Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
- Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of

data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

- Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.
- Lifelong learning: Ability to acquire knowledge and skills, including 'learning how to learn', that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing

6. GUIDELINES FOR WRITING QUALIFICATION DESCRIPTOR

A qualification descriptor indicates the generic outcomes and attributes expected for the award of a particular type of qualification (for eg. a bachelor's degree or a bachelor's degree with honours). The qualification descriptors also describe the academic standard for a specific qualification in terms of the levels of knowledge and understanding, skills and competencies and attitudes and values that the holders of the qualification are expected to attain and demonstrate. These descriptors also indicate the common academic standards for the qualification and help the degree-awarding bodies in designing, approving, assessing and reviewing academic programmes. The learning experiences and assessment procedures are expected to be designed to provide every student with the opportunity to achieve the intended programme learning outcomes. The qualification descriptors reflect both disciplinary knowledge and understanding as well as generic skills, including global competencies, that all students in different academic fields of study should acquire/attain and demonstrate. Qualification descriptors for a bachelor's degree programme: The students who complete three years of full-time study of an undergraduate programme of study will be awarded a bachelor's degree. Some of the expected learning outcomes that a student should be able to demonstrate on completion of a degree-level programme may include the following:

- Demonstrate (i) a fundamental/systematic or coherent understanding of an academic field of study, its different learning areas and applications, and its linkages with related disciplinary areas/subjects; (ii) procedural knowledge that creates different types of professionals related to the disciplinary/subject area of study, including research and development, teaching and government and public service; (iii) skills in areas related to one's specialization and current developments in the academic field of study.
- Use knowledge, understanding and skills required for identifying problems and issues, collection of relevant quantitative and/or qualitative data drawing on a wide range of sources, and their application, analysis and evaluation using methodologies as appropriate to the subject(s) for formulating evidence-based solutions and arguments;

- Communicate the results of studies undertaken in an academic field accurately in a range of different contexts using the main concepts, constructs and techniques of the subject(s);
- Meet one's own learning needs, drawing on a range of current research and development work and professional materials;
- Apply one's disciplinary knowledge and transferable skills to new/unfamiliar contexts, rather than replicate curriculum content knowledge, to identify and analyse problems and issues and solve complex problems with well-defined solutions.
- Demonstrate subject-related and transferable skills that are relevant to some of the job trades and employment opportunities.

7. GUIDELINES FOR WRITING COURSE OUTCOMES (COS)

Course Outcomes (COs) are the central to the curriculum of offered program by any institution/university. Course Outcomes articulate to students, faculty, and other stakeholders, what students will achieve in each course and how their learning will be measured.

A well-written course outcomes should involve the following parts:

Here are some guidelines to write a good Course Outcome:

a. When writing course outcomes, there should be flexibility in the sentence structure. Some common stems are:
   - At the end of the course, learners should be able to….
   - Upon completion of this course, learners will be able to…
   - Learners should be able to…

b. The focus of student learning outcomes is to make students academically sound, skilful, and prepare them for life-long learning therefore the learning outcomes should be SMART (Specific, Measurable, Achievable, Realistic and Time-bound) so that the instructor would be able to evaluate whether learners have achieved the expected outcomes. The course outcome statement should have the action verbs to determine what learner is expected to achieve after completing the course.

c. The Blooms Taxonomy should be use as a useful guide for identifying actionable verbs while formulating the course outcomes.

   Bloom's taxonomy is a framework for teaching and learning where each level depends on the one below. It's often depicted in the form of a pyramid. Basic knowledge is the first stage of learning, leads to the development of the skills and abilities that are crucial to completing the pedagogical process: Comprehension, application, analysis, synthesis, and evaluation. The belief is that students move up through each level of the pyramid in Bloom's taxonomy, starting from very basic learning, to acquire deeper knowledge on a subject, with each level crucial to the development of the next.

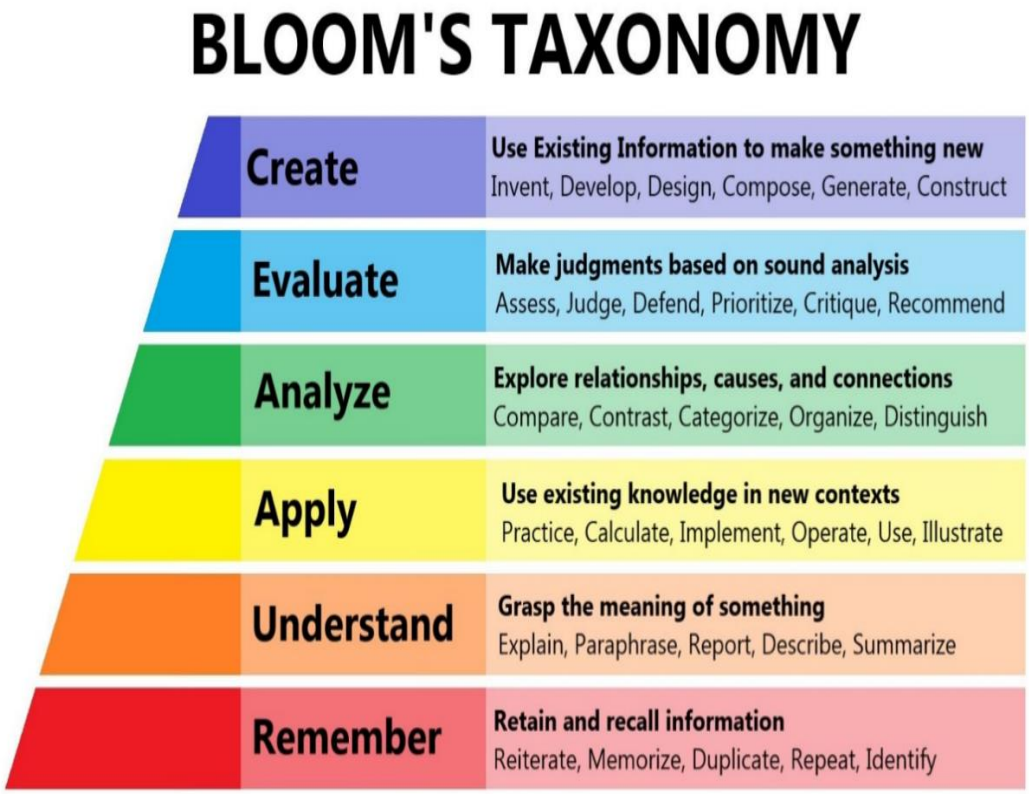


Image Source: https://bloomstaxonomy.net/

I. Level.1. Remembering: This level helps build a solid foundation and acts as a steppingstone towards more complex learning. At this level, students are asked to memorize and recall facts.
II. Level.2. Understanding. This level asks students to explain course concepts in their own words.
III. Level.3. Applying. This level encourages students to extend their learning outside the classroom by finding similarities and differences in the real world.
IV. Level.4. Analyzing. This level allows students to use their critical thinking skills to understand how or why different concepts work together.
V. Level.5. Evaluating. This level asks students to make value judgments about the material they've learned.
VI. Level.6. Creating. This level encourages students to demonstrate their knowledge by building something tangible or conceptual.

Depending on the expectations of a learning outcome, a single action verb could require at the varying levels of complexity. The followings actionable verbs can be used, while preparing course outcomes.

Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
• define • describe • duplicate • enumerate • examine • identify • label • list • locate • match • memorize • name • observe • omit • quote • read • recall • recite • recognize • record • repeat • reproduce • retell • select • state • tabulate • tell • visualize	• ask • associate • cite • classify • compare • contrast • convert • describe • differentiate • discover • discuss • distinguish • estimate • explain • express • extend • generalize • give examples. • group • identify • illustrate • indicate • infer • interpret • judge • observe • order • paraphrase • predict • relate • report • represent • research • restate • review • rewrite • select • show • summarize • trace • transform • translate	• act • administer • apply • articulate • calculate • change • chart • choose • collect • complete • compute • construct • determine • develop • discover • dramatize • employ • establish • examine • experiment • explain • illustrate • interpret • judge • manipulate • modify • operate • practice • predict • prepare • produce • record • relate • report • schedule • simulate • sketch • solve • teach • transfer • write	• advertise • analyze • appraise • calculate • categorize • classify • compare • conclude • connect • contrast • correlate • criticize • deduce • devise • diagram • differentiate • discriminate • dissect • distinguish • divide • estimate • evaluate • experiment • explain • focus • illustrate • infer • order • organize • plan • prioritize • select • separate • subdivide • survey • test	• appraise • argue • assess • choose • compare • conclude • consider • convince • criticize • critique • debate • decide • defend • discriminate • distinguish • editorialize • estimate • evaluate • find errors • grade • judge • justify • measure • order • persuade • predict • rank • rate • recommend • reframe • score • select • summarize • support • test • weigh	• adapt • anticipate • assemble • collaborate • combine • compile • compose • construct • create • design • develop • devise • expres • facilitate • formulate • generalize • hypothesize • infer • integrate • intervene • invent • justify • manage • modify • negotiate • originate • plan • prepare • produce • propose • rearrange • reorganize • report • revise • rewrite • role-play • simulate • solve • speculate • structure • test • validate • write

Adapted from Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing*, Abridged Edition. Boston, MA: Allyn and Bacon.

Examples of some Course Outcomes:

Arts, Media, and Design

- *Discriminate* among different Western music styles.
- *Discuss* how the historical and cultural events contextualize the creation of an artwork.

Business

- *Compare* and *contrast* different types of business ownership.
- *Evaluate* and *classify* various marketing strategies.

Computer and Information Sciences

- *Describe* the scientific method and provide an example of its application.
- *Develop* solutions for security, balancing technical and privacy issues as well as business concerns.

Engineering

- *Prepare* engineering documents that coherently present information for technical and non-technical audiences.
- *Compile* and *summarize* current bioengineering research to discuss the social, environmental, and legal impacts.

Health Sciences

- *Describe* how nutrition and life style choices impact the life cycle.
- *Assess* gross muscle strength of upper and lower extremities when assisting a patient in ambulation.

Science

- *Distinguish* between healthy and unhealthy physical, mental, and emotional patterns.
- *Calculate* germination rates of various seeds.
- *Describe* and *apply* research methods to study child psychology.
- *Create* and *interpret* molecular models and/or chemical computations.

Social Sciences and Humanities

1. *Outline* the structure of the Constitution of the United States.
2. *Formulate* a stance on a political issue and *support* the position.

8. GUIDELINES FOR WRITING PROGRAM OUTCOMES (POS)

Program outcomes are statements conveying the intent of a program of study. It refers to what a student should know or be able to do at the end of a program. They are often seen as the knowledge and skills students will have obtained by the time, they have received their intended degree.

Programme outcomes includes subject-specific skills and generic skills, including transferable global skills and competencies, the achievement of which the students of a specific programme of study should be able to demonstrate for the award of the certificate/Diploma/Degree qualification. The programme learning outcomes would also focus on knowledge and skills that prepare students for further study, employment, and citizenship. They help ensure comparability of learning levels and academic standards across colleges/universities and provide a broad picture of the level of competence of graduates of a given programme of study. A programme of study may be monodisciplinary, multi-disciplinary or inter-disciplinary.

Program Outcomes as defined by NBA (PO) – An Example

Engineering Graduates will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics,

natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. 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.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. 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.

The above can be used as a reference for formulating the program outcome of the offered program.

Important to remember for writing Program Outcome:

1. The program outcome must flow directly from, and support, the college and division/ school/ department mission. The connection between the mission and the outcome should be clear.
2. A program outcome must be directly related to the academic discipline of the program. Focus on program outcomes that reflect the specific knowledge and skills expected from the students to acquire as part of their educational experience in the program.
3. A program outcome must be focused on learning outcomes rather than curricular inputs. Be sure to focus on the knowledge and skills that program graduates should possess.
4. A program outcome must communicate a single outcome rather than combine multiple outcomes into a single statement.

9. GUIDELINES FOR WRITING PROGRAM SPECIFIC OUTCOMES (PSOs)

Program Specific Outcomes are the statements that describe what the graduates of a specific subject or program should be able to do at the end of program. Program Specific Outcomes make students realize the fact that the knowledge and techniques learnt in this course has direct implication for the betterment of society and its sustainability. These are expected learning outcomes that will help the instructor to check for the understanding and learning achieved by the students both in and outside the class.

Program Specific Outcomes (PSOs) are decided by the head of the institution with the help of HoDs and department experts. There usually are two to four PSOs for a department. The followings PEOs could be used as a reference:

At the end of the program, the student

PSO 1: should be able to understand the concepts of Electronics & Communication engineering and their applications in the field of semiconductor technology, consumer electronics, embedded system, communication/ networking and other relevant areas.

PSO 2: Should have an ability to apply technical knowledge and usage of modern hardware & software tools related to Electronics & Communication engineering for solving real world problems.

PSO 3: Should have the capability to analyze, comprehend, design & develop electronic subsystems/ systems for a variety of engineering applications and thus demonstrating professional ethics & concern for societal wellbeing.

10. MAPPING OF COs, POs and PSOs

The COs, POs and PSOs Mapping creates a link between the Course Outcomes (Cos) and program outcomes (POs), and Program Specific Outcomes for each lesson and assessment. It helps to encourage and apply Outcome Based Education for attaining a futuristic approach towards education along with improved learning outcomes.

The common matrix used is:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	-	-	2	-	-	2	3	-	-
CO2												
CO3												
CO4												
CO5												
CO6												
Avg.												

Note: Avg. = Average

For the mapping of Cos, POs and PSOs, the instructors are required to:

1. enter the correlation level wherever applicable related to the course.
   The following can be entered against the intersection of COs and the related POs/PSOs:

Level	Keywords used in writing Course Outcome
No Mapping (0)	Key words not related with course or any outcome
(1)	Part of PO is reflected through keywords/action verbs
(2)	Major part of PO is reflected through keywords/action verbs. + moderate level performance is expected from student to achieve PO
(3)	Exact action verb of PO + critical performance expected from student to achieve PO

2. Once entered for all COs, POs & PSOs, calculate the average. The score of each course average would require during the mapping of the COs, POs and PSOs of the Program. As depicted below:

Sem.	Course Code	Course Title	C	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4
I															
I															
II															
II															
III															
III															
IV															
IV															
V															
Avg.															

Note: C – Credits, PO – Program Outcome, PSO – Program Specific Outcome

11. ASSESSMENT METHODS & TOOL FOR COs

Assessment is a core academic activity and an essential component of the learning process. Assessment of Program indicates the quality and extent of student achievement or performance, and therefore by inference a judgment about the student's learning. It inevitably shapes the learning that takes place; that is, what students learn and how they learn it should reflect closely the purposes and objectives of the program.

Program assessment is an ongoing process to support educational quality and student achievement. It is the main mechanism to monitor the effectiveness of the learning environment based on evidence that determine whether students have met the learning outcomes and Program objectives.

Methods and tools for the assessment of the attainment of COs are:

- Direct method of assessment includes three domains of student learning i.e., cognitive domain, affective domain, and psychomotor domain.
  Assessment is done through two ways - external and internal.
  - External – Theory exam, lab/practical exams, and project evaluation etc.
  - Internal – Mid-term, class assignments, tutorials, seminars/class project etc.
- Indirect method of assessment conducted by collecting and analysis of feedback from the stakeholders to reflect on student's learning. The student's feedback is taken on each course and programme after each semester.

Direct Tools: (Measurable in terms of marks and w.r.t. CO Assessment done by faculty at Institute level.

Indirect Tools: (Non measurable in terms of marks and w.r.t. CO Assessment done at University Level

Methods and tools for assessment for the attainment of COs are:

<table>
<tr><th colspan="9">CO Assessment Tools</th></tr>
<tr><th colspan="5">Direct CO Assessment (80%)</th><th colspan="4">Indirect CO Assessment (20%)</th></tr>
<tr><td colspan="5">Direct
(CO Assessment)</td><td rowspan="2">Course Exit Survey</td><td rowspan="2">Alumni Survey</td><td rowspan="2">Employer Survey</td><td rowspan="2">Parent Survey</td></tr>
<tr><td>Mid/End Term Exam</td><td>CIA Assignment, Practical, Seminar, Project</td><td>Other Activities, Course Exit Survey</td><td>University Exam (Theory, O/POE)</td><td>External Feedback (Examiner)</td></tr>
</table>

12. RUBERICS FOR ASSESSMENT

A rubric is an assessment tool that clearly indicates achievement criteria across all the components of any kind of student work, from written to oral to visual. It can be used for marking assignments, class participation, or overall grades.

Rubrics are used to examine how well students have met CO or PO rather than how well they perform compared to their peers. It typically include measurable descriptors that define expectations at each level of performance for each criterion.

Sample Rubrics for CO assessment in Laboratory: (10 Marks)

Category	**Level of Performance**		
	3 Marks	**2 Marks**	**1 Marks**
Performance in Lab (3)	• Able to perform experiment independently within prescribed time. • The result is close or to standard value.	• Able to perform experiment within prescribed time. • Large deviation of result from standard value	• Able to perform the experiment partially with no results.
Level of Understanding / Q&A (3)	• Able to show strong theoretical background of experiment. • Able to interpret proper data to reach conclusion	• Partially show strong theoretical background of experiment • Partially able to interpret data to reach conclusion.	• Lack of theoretical background of experiment or lack of interpretation of data
	Documentation Level		
	4 Marks	**3 Marks**	**2 Marks**
Quality of Submission (4)	• Graphs, table, contents are well constructed. • All-important calculations and result have been clearly made. • Conclusions/ observations/ comments done clearly	• Shortfalls found in any of the contents of the report viz. graphs, tables, calculations, results, conclusions/ Comments, etc.	• Report submitted but not written properly.

13. GUIDELINES FOR SETTING TARGETS AND ATTAINMENT OF COs & POs

Each faculty must decide the targets and the attainment level for COs and POs based on last three- or five-year data. The set target level is the set benchmark to ensure the continuous improvements in the graduate's performance.

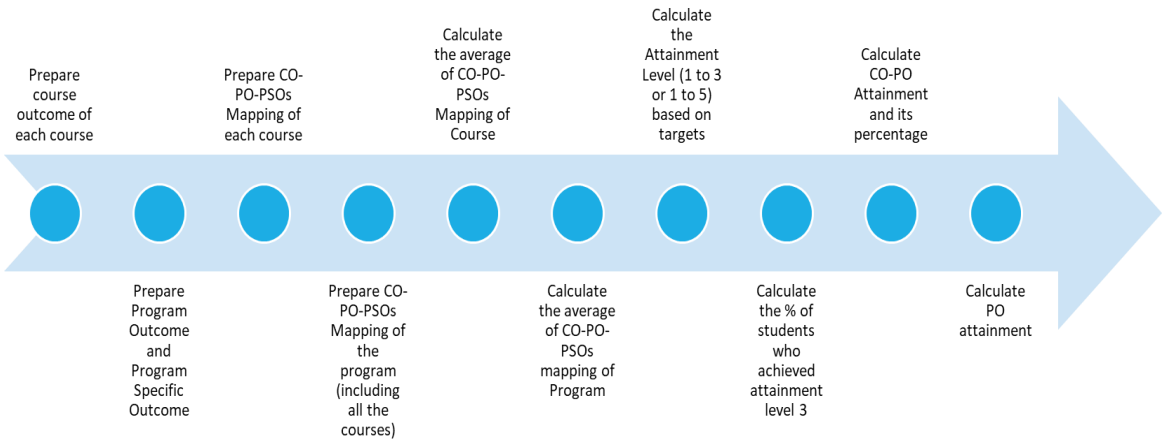
The below mentioned template can be used for setting targets and attainment level:

Attainment Level	Target
Level 1 – Low	----% students gets at least ----% marks in final examination
Level 2 – Medium	----% students gets at least ----% marks in final examination
Level 3 – High	----% students gets at least ----% marks in final examination

An illustration:

Attainment Level	Target
Level 1 – Low	70% students gets at least 60% marks in final examination
Level 2 – Medium	70% students gets at least 70% marks in final examination
Level 3 – High	70% students gets at least 80% marks in final examination

The below mention figure represents the overall process for the attainment of POs:



14. COURSE OUTCOME ATTAINMENT

Course attainment refers to the level of success or achievement a student reaches in a particular course or academic subject. It is a measure of how well a student has mastered the learning objectives and outcomes of a specific course. Course attainment can be assessed through various means, such as exams, assignments, projects, presentations, and class participation.

It helps educators and institutions track the effectiveness of their teaching methods and curriculum and allows them to identify areas for improvement. For students, course attainment serves as a measure of their academic performance and helps them understand their strengths and areas where they may need to focus more effort to excel in their studies.

14.1. Attainment Weightage

Course outcome attainment weightage refers to the relative importance or value assigned to each course outcome or learning objective within a particular course. It is a way of indicating the significance of each learning outcome in determining the overall success or grade a student achieves in the course.

Consider following weightage for CO Assessment Tools

CO Assessment Tools	
Direct PO Assessment (80%)	Indirect PO Assessment (20%)

Consider following weightage for CO Assessment Tools

PO Direct Assessment Tools = CO Assessment Tools	
Direct CO Assessment	Indirect CO Assessment
80	20

14.1.1. Illustration of Internal Assessment Examination Attainment:

Course	Human Resource Management
Maximum Marks	30
Number of Students Appeared	60
Passing Level (Target)	12 (With 40% as Passing Criteria)

Now, we need target (mentioned above in table) and marks of all students to calculate attainment. The table below shows marks of all students:

5	11	01	09	05	19	19	19	12	15
10	16	23	11	21	17	22	12	13	14
12	0	21	19	12	06	21	16	17	19
23	0	20	12	15	05	28	29	23	11
24	0	27	13	14	12	23	28	21	19
29	18	17	17	19	11	18	23	20	12

Number of Students achieving 12 Marks	46
% of students achieving 12 Marks	(46/60) X 100 = 76.66%

Attainment Level 1 – if 40 % students score more than target
Attainment Level 2 – if 50 % students score more than target
Attainment Level 3 – if 60 % students score more than target

Then Attainment Level is = 3 (from 76.66%)

14.1.2. Illustration of Course Exit Survey/Rubric Based Assessment & Attainment

Course	**Human Resource Management**
Maximum Marks	**5**
Number of Students Appeared	**60**
Passing Level (Target)	**3 (> 50%)**

Here, the target (mentioned above in table) and response/feedback of all students to calculate attainment. The table below shows score/response of all students:

4	4	2	4	5	3	3	2	3	2
3	1	3	5	5	2	3	3	3	3
2	1	4	4	4	2	2	4	2	4
4	3	5	3	3	4	4	5	4	5
1	2	4	3	2	1	5	4	5	4
2	2	5	2	4	1	4	5	4	5

Number of students giving 3 or more score	42
% of students with 3 or more score	(42/60) *100 = 70%

Attainment Level 1 – if 40 % students score more than target.

Attainment Level 2 – if 50 % students score more than target.

Attainment Level 3 – if 60 % students score more than target.

The Attainment Level is: 3 (from 70% students)

14.2. Course Outcome Attainment Calculation

Course outcome attainment calculation is a method to assess the achievement of learning outcomes by students in a specific course. It helps determine how well students have mastered the intended objectives of the course and whether the course has been effective in achieving its educational goals.

An illustration Course Attainment Calculation:

Attainment through Direct Assessment	
Target attainment through internal assessment (Mid Term Examination, Tests, Presentation, Assignment etc.,)	2 (Moderate)
Target Attainment through External Assessment (End-term Examination)	2 (Moderate)
Attainment through Indirect Assessment	
Target Attainment through Feedback	3 (Substantial)

Final CO Attainment of the Course (Including Internal & External Assessment):

Overall CO Attainment = (Weightage x Direct CO attainment) + (Weightage x Indirect CO
attainment)

As discussed earlier; the following are the weightage for calculating CO attainment:

<table>
<tr><td colspan="2">Direct CO Assessment</td><td>Indirect CO Assessment</td></tr>
<tr><td colspan="2">80%</td><td rowspan="2">20%</td></tr>
<tr><td>50% Direct External Attainment</td><td>30% Direct Internal Attainment</td></tr>
</table>

= (50% Direct External Attainment + 30% Direct Internal Attainment) + 20% Indirect Attainment

= (50% of 2 + 30% of 2) + 20% of 3

= 1+0.6+0.6 = 2.2, **i.e. 2 = Moderate Attainment**

15. ASSESSMENT TOOL AND EVALUATION OF POs

Assessment tools and evaluation of POs (Program Outcomes) are essential components of any educational program to ensure that students are achieving the intended learning outcomes.

15.1. Assessment Tool for the Evaluation of POs

PO Assessment Tools				
Direct PO Assessment (80%)	Indirect PO Assessment (20%)			
Average POs and PSOs obtained from CO-PO attainment	Program Exit Survey	Alumni Survey	Employer Survey	Parent Survey

Let us take the CO-PO mapping of "Engineering Workshop" of Semester I / Year I of B.Tech. Civil Engineering:

Courses	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
Course 1	3	1	2	-	-	1	-	-	-	-	-	1	3	2	1
Course 2	3	2	2	-	3	1	-	-	-	-	2	3	3	2	-
Course 3	3	2		-	2	-	-	-	-	-	1	3	3	2	-
Course 4	3	2	3	3	-	-	-	-	-	-	2	3	3	2	1
Course 5					1										
Course 6					-										
Course 7					-										
Course 8					3										
Course 9															

As per the above table, the outcome of 4 Course: Course-2, 3, 5 & 8 are mapped with some PO PO5

Now, PO3 attainment will be based on the attainment level of Direct Assessment and Indirect Assessment.

A. Direct Assessment (80%):

Courses	Score
Course 2	3 – High
Course 3	2 – Moderate
Course 5	1 – Low
Course 8	3 – High

Attainment Level: 3+2+1+3 = 9/4 = 2.25

B. Indirect Assessment (20%):

Survey / Feedback Analysis of Course 2, 3, 5, & 8 – as per the level 1, 2, 3, 4, 5

Let us assume, if the level is 2

Attainment of PO5 = 80% Direct Assessment + 20% Indirect Assessment

= 0.80X2.25 + 0.2X2

= 1.8 + 0.4

= 2.2 >> Medium Level Attainment

Similarly, all the POs Attainment can be calculate using the above-mentioned methods.

16. OVERALL ATTAINMENT OF PROGRAM OUTCOMES

Assessing the overall attainment of program outcomes involves measuring the extent to which students have achieved the learning objectives and goals set by the program. Here are some steps to evaluate program outcomes:

A) Prepare Course Outcome table for each course.

B) Prepare Program Outcome (PO+PSO = 12+3) of the Program

C) Prepare CO-PO mapping for all courses.

D) Calculate average of CO-PO mapping for all course

E) Calculate % of students achieved CO-PO target level at the scale of 3

   Average CO Attainment = number of students achieved the target / total no. of students

   Scaling at the level of 3 as: >60% - 1, >70% - 2, >80% - 3

F) Calculate average of CO-PO mapping

G) Calculate CO-PO Attainment of all courses.

H) Calculate % of CO-PO Attainment = CO-PO Attainment / Average of CO-PO Mapping

I) Calculate PO Attainment

   PO Attainment = % of CO-PO Attainment * Average of CO-PO Mapping

17. STRATEGIES FOR SLOW AND ADVANCE LEARNERS

Students differ from one another in terms of cognitive development as well as affective attainments and thus some students are slow in learning while others learn at an advanced pace. The National Education Policy-2020 underlines the fact that a good education institution is one in which every student feels welcomed and cared for and where a safe and stimulating learning environment exists. Of late there is an increasing emphasis on making teaching and learning process student centric and inclusive with quality and equity.

SGT university has well formulated policy to identify slow and advance learner and strategies for addressing and assisting them in their academic performance and achieve excellence in their career.

The policy of slow and advance learner can be referred as annexure.1.

18. LIST OF DOCUMENTS

Sl. No.	Title	Details
1	Vision, Mission of Institute	Maintain at Dept. Level (PC & HoD)
2	Vision, Mission of Program	Maintain at Dept. Level (PC & HoD)
3	PEO of Program, PEO-PO/PSO Mapping	Maintain at Dept. Level (PC & HoD)
4	PO and PSO of Program	Maintain at Dept. Level (PC & HoD)
5	CO + PO/PSO + Mapping	Maintained by every faculty in Course File
6	Revised Bloom's Taxonomy Level and OBE Framework	Print to be maintained in Course File of Faculty & displayed in department all labs
7	Course List with Course Codes	Maintain at Dept. Level (PC & HoD)
8	List of PO Assessment Tools	Maintain at Dept. Level (PC & HoD)
9	List of CO Assessment Tools Used	Maintained by every faculty in Course File
10	Course and Module Coordinators	Maintain at Dept. Level (PC & HoD)
11	Course Plan	Along with delivery details and assessment tools by Faculty
12	Attainment Levels/ Targets of all courses of your program	Maintained by every faculty in Course File
13	Rubrics	Course wise rubrics to be maintained by every Faculty All activity rubrics to be maintained at deptt. Level (PC & HoD)
14	Record of all Assessment Details	Test Papers, Model Answers, Sample Answer Papers, Results, Sample Journals of students, Lab Manuals, Sample Seminar, Project Report & other record concerned with

		assessment to be maintained by Faculty
15	Slow-Advanced Learners	Identification, Action Taken Record to be maintained by Faculty
16	Course Exit Survey of every course	To be maintained by concerned Faculty.
17	Program Exit Survey, Alumni Feedback, Employer Feedback	End of Final Year: Maintain at Deptt. Level (PC & HoD)
18	CO Attainment	At End of Course: Maintained by Faculty and to be submitted to department
19	PO Attainment	At end of A.Y.: (Direct + Indirect) to be maintained by PC & HoD at Deptt. Level
20	Impact Analysis and Continuous Improvement Related Documents	CO level documents to be maintained by the concerned faculty. PO level documents to be maintained by PC and HoD.

Slow and Advance Learner Policy Letter as Approved from BoM

SGT UNIVERSITY

SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY

(UGC & AICTE Approved) Gurugram, Delhi-NCR

TO WHOM IT MAY CONCERN

Policy for Slow and Advanced Learners was prepared by the Registrar on 2nd August, 2022 and same was submitted to the Vice Chancellor for approval in anticipation of the approval of Board of Management so that the same can be implemented immediate. At later course of action, the said policy was submitted to the Board of Management in its 39th meeting which was held on 30th September, 2022 for formal approval.

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SGT UNIVERSITY

SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY
GURGAON, DELHI-NCR
(Established by the Haryana Act No. 8 of 2013)

Policy for Slow and Advanced Learners

Background:

Students basically differ from one another in terms of cognitive development as well as affective attainments and thus some students are slow in learning while others learn at an advanced pace and level. NEP-2020 underlines the fact that a good education institution is one in which every student feels welcomed and cared for and where a safe and stimulating learning environment exists. Of late there is an increasing emphasis on making teaching and learning process student centric and inclusive, with quality and equity. Thus there is a pressing need to formulate a policy in which all students- both slow learners as well as quick and advanced learners thrive and are able to achieve required levels of fruitful learning which is accomplished by assessing the abilities of students in the following manner: -

1. **Identification of Slow and Advanced Learners:**

   a) **Formal method**

   For newly admitted students, based on their previous academic records and observation of activities and brain storming sessions during the initial Induction/Orientation days, the students may be categorized into advanced learners and slow Learners. In subsequent semesters the identification may be more systematically based on;-

   (i) University Examination Results
   (ii) Internal Assessment
   (iii) Performance in Extra and Co-curricular Activities

   b) **Informal method**

   It is, however, possible to identify slow and advanced learners through an informal process of observation as well.

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The student commonly called a slow learner is one who cannot learn at an average rate from the instructional resources, texts, workbooks, and learning materials that are designed for the majority of students in the classroom.

The most obvious characteristic of a slow learner is a limited attention span compared to more able students. To keep these students actively engaged in the learning process requires more than the usual variation in presentation methods (direct, indirect), classroom climate (co-operative, competitive), and instructional materials (films, workbooks, co-operative games, simulations).

Other immediately noticeable characteristics of slow learners are their deficiencies in basic skills (reading, writing, and mathematics), their difficulty in comprehending abstract ideas, and most disconcerting, their sometimes unsystematic and careless work habits.

Advanced learners, on the other hand, are the students who understand a taught topic relatively fast than the other students in the class and attain high scores. They have more potential and talent than the others in the class. These students are with better academic understanding, as well.

2. Thrust areas of Policy for Slow learners:-

- Orientation and Induction Progarmme at University and Faculty level for freshers
- Identification of slow and advanced learners by formal and informal methods
- Group formation of slow learners and activities thereby under monitoring by advanced learners
- Bridge course for first year students
- Remedial classes
- Personal counselling
- Provision of simple notes and interesting course material
- Teacher-Guardian/Mentor Mentee schemes
- Providing all need-based facilities in Departments and Libraries

3. Instructional Strategies and Interventions for Slow Learners:-

A. Bridge Course

A bridge course for newly admitted students is to be conducted every year before the commencement of the first semester classes. The main objective of the course is to bridge the gap between subjects studied at Pre-university level and subjects they would be studying in the University. The syllabus for the course is to be framed in such a way that equal importance is given to both- the concerned discipline subjects and

personality development, which includes soft skills, sports and cultural activities.

B. **Compensatory Teaching**

Compensatory teaching is an instructional approach that alters the presentation of content to circumvent a student's fundamental weakness or deficiency. This may involve modifying an instructional technique by including a visual representation of content, by using more flexible instructional presentations (films, pictures, illustrations), or by shifting to alternate instructional formats (self-paced texts, simulations, experience-oriented workbooks).

C. **Remedial Teaching**

Remedial teaching is the use of activities, techniques and practices to eliminate weaknesses or deficiencies that the slow learner is known to have. For example deficiencies in basic math skills are reduced or eliminated by re-teaching the content that was not learned earlier. It focuses on basic concepts, develop better study habits, and to build confidence in the students for respective subject. Remedial teaching/class helps to close the gap between what the student knows and what he is expected to know. The instructional environment, however, does not change, as in the compensatory approach.

D. **Developing Lessons incorporating Students' Interests and Needs**

This helps address the short-attention spans of slow learners. Also, these students should be made to feel that some of the instructions have been designed with their specific interests or experiences in mind. Oral or written autobiographies at the beginning of the year, or simple inventories in which students indicate their hobbies, jobs, and unusual trips or experiences can provide the structure for the lesson plans, special projects, or extra-credit assignments in the year.

E. **Varying Instructional Techniques frequently**

Switching from lecture to discussion and then to seatwork provides the variety that slow learners need to stay engaged in the learning process. In addition to keeping their attention, variety in instructional technique offers them the opportunity to see the same content presented in different ways. This increases opportunities to accommodate the different learning styles that may exist among slow learners and provides some of the remediation that may be necessary.

F. **Incorporating Individualized Learning Materials**

Slow learners respond favourably to frequent reinforcement of small segments of learning. Therefore, programmed texts and interactive computer instruction often are effective in remediation of basic skills of slow learners.

G. **Audio and Visual Contents**

One common characteristic among slow learners is that they often learn better by seeing and hearing than by reading. Incorporating films, videotapes, and audio into lessons helps accommodate the instruction to the strategies learning modalities among slow learners. Emphasizing concrete and visual forms of content also helps compensate for the general difficulty slow learners have in grasping abstract ideas and concepts.

H. **Providing Peer Tutors for Students needing Remediation**

Peer tutoring can be an effective aid to the targeted teaching objectives, especially when tutors are assigned so that everyone being tutored also has responsibility for being a tutor. The learner needing help is not singled out and has a stake in making the idea work, because his or her pride is on the line, both as a learner and as a tutor.

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(iii) Helping them to participate in group discussions, technical quizzes to develop analytical and problem solving abilities in them and thereby, to improve their presentation skills.

(iv) Encouraging them to participate in National International Conferences and also to make presentations

(v) Stirring the advanced learners to make quality publications and creative contributions to the academic as well as to the practical world

(vi) Advanced learners may be given special prizes and special facilities like digital library laptops and special scholarships for making their ideas become visible.

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Put up for your approval

Registrar
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Budhera, Gurugram

Registrar
SGT University

Approved in anticipation of the approval of Board of Mgmt

Vice-Chancellor
SGT University

Registrar
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Budhera, Gurugram

No. : SGTU/BOM/39.13/2022 Dated: 30th September, 2022

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