



Gujarat Technological University

(Accredited with A+ Grade by NAAC)

Report on “Awareness Workshop on Outcome-Based Education and Accreditation (OBE&A)”

**Jointly organized by National Board of Accreditation and
Gujarat Technological University**

Date: 29th March, 2025.

Venue: J. B. Auditorium, Ahmedabad Management Association, Ahmedabad.

INTRODUCTION

National Board of Accreditation and Gujarat Technological University jointly organize Awareness Workshop on Outcome-Based Education and Accreditation (OBE&A) for faculty members of Government and Self-financed Engineering and Polytechnic colleges and Universities of Gujarat on 29th March, 2025. The objective of the workshop is to provide participants with a comprehensive understanding of the principles, implementation strategies, and benefits of Outcome-Based Education (OBE) and the accreditation processes associated with it.

The workshop on 29-03-2025 focused on improving higher education through Outcome-Based Education (OBE) and accreditation practices. It highlighted the importance of quality enhancement in curriculum design, teaching methodologies, and continuous improvement aligned with the United Nations Sustainable Development Goals (SDGs) as well as with international standards.



TECHNICAL SESSION SUMMARY

Session Highlights:

NBA Introduction by Dr. Anil Kumar Nassa, Member Secretary, NBA, New Delhi:

- Emphasis on credible and transparent accreditation for higher education programs in India.
- Outcome-Based Education (OBE) as a core approach focusing on Graduate Attributes (GAs) and Program Outcomes (POs).
- Implementation of a two-tier accreditation system for autonomous and affiliated institutions.
- Importance of continuous quality improvement rather than fault-finding.

Key Findings from Dr. Nassa's Session:

- Accreditation of programs rather than institutions.
- Transparency through feedback mechanisms and clear communication.
- Comparison of Tier-I and Tier-II accreditation marks for various criteria.
- Faculty guidelines, including SFR standards and qualifications.

OBE and SAR Insights by Prof. Sanjay Agrawal, NITTTR, Bhopal:

- Understanding and implementing OBE principles for accreditation.
- Focus on continuous improvement in education quality.
- Integration of Program Outcomes (POs) and Program Educational Objectives (PEOs) in curriculum design.
- Assessment of student performance and curriculum effectiveness.

Ethical Engineering and Sustainability by Prof. S.S. Pattnaik, Vice Chancellor, Odisha State Open University, Sambalpur, Odisha:

- Integrating ethical practices with engineering education to align with the UN SDGs.
- Emphasis on sustainable development, collaboration, and multidisciplinary approaches.
- Developing skills such as problem-solving, critical thinking, and lifelong learning.

SESSIONS WISE KEY TAKEAWAYS

SESSION 1- Topic: Awareness Workshop on Outcome-Based Education & Accreditation

Presenter: Dr. Anil Kumar Nassa

Member Secretary, National Board of Accreditation (NBA), New Delhi

Overview of NBA

The National Board of Accreditation (NBA) was established in 1994 under the purview of the AICTE Act, with the mission to foster excellence in technical education. It gained autonomy in 2010 and, since 2013, operates independently in both administrative and financial matters. Unlike some accreditation bodies that evaluate entire institutions, NBA focuses specifically on the accreditation of individual programs. This allows for a more focused and detailed evaluation of program-level educational quality, teaching-learning processes, and outcome attainment.

NBA's Accreditation Philosophy

NBA's approach to accreditation is grounded in principles of transparency, accountability, and a commitment to continuous improvement. It encourages institutions to view accreditation not as an audit but as a developmental tool. The emphasis is on providing constructive feedback that enables institutions to enhance their systems and practices. NBA also promotes the development of benchmarks and the sharing of best practices among peer institutions to build a culture of quality.

Outcome-Based Education (OBE)

At the heart of NBA's accreditation model lies Outcome-Based Education (OBE). OBE is a student-centered approach that emphasizes what learners are expected to achieve at the end of a program. It is aligned with Graduate Attributes (GAs) and Program Outcomes (POs), ensuring students acquire knowledge, skills, and ethical values relevant to their profession. The eleven POs include competencies such as engineering knowledge, ethical practices, communication, teamwork, critical problem-solving, and a commitment to lifelong learning.

This framework enables institutions to clearly define learning goals and evaluate the extent to which students achieve them.

Two-Tier Accreditation System

NBA employs a two-tier system of accreditation to differentiate between types of institutions:

- **Tier I** is designed for autonomous institutions and university departments, which have the flexibility to frame their curriculum.
- **Tier II** caters to affiliated institutions that follow curricula prescribed by universities or regulatory bodies. While both tiers use the same set of evaluation criteria, the expectations in terms of curriculum development, faculty empowerment, and institutional processes differ to account for autonomy levels.

Program Outcomes (POs)

Each of the 11 Program Outcomes describes a set of skills and knowledge areas that students must develop during their education. These include engineering fundamentals, problem analysis, solution design, usage of modern tools, understanding societal and environmental contexts, ethical responsibility, and project management. Institutions are required to embed these outcomes in their curriculum and continuously assess student attainment through direct and indirect tools such as exams, projects, and surveys.

Pre-Qualifiers and Accreditation Criteria

To be eligible for NBA accreditation, a program must have graduated at least two batches of students. The duration of accreditation granted is based on the level of compliance:

- **Six-year accreditation** is awarded to programs that fully comply with at least six out of ten criteria without any deficiencies.
- **Three-year accreditation** is given when at least three criteria are met satisfactorily and there are no critical deficiencies. Faculty qualifications and the Student-Faculty Ratio (SFR) are critical components of the assessment:
- For a 6-year accreditation, 20% of the faculty must hold a PhD; for a 3-year accreditation, 10% is sufficient.
- The SFR should be 20:1 for UG Engineering programs and 25:1 for a 3-year accreditation. The same applies for PG and MCA programs. Pharmacy and Management programs may require stricter ratios.

Faculty and SAR Guidelines

Only full-time regular faculty and qualified contractual staff are considered valid for NBA accreditation. Faculty records, including their qualifications, experience, and contributions to teaching and research, must be well-documented and made available during the NBA's onsite visits. Additionally, institutions must maintain standardized academic records using defined terms such as Current Academic Year (CAY), CAY minus one (CAYm1), and so on, to ensure clarity and consistency in reporting.

Emphasis on Quality Assurance

NBA accreditation is designed not merely as a certification process but as a means to achieve excellence through introspection and enhancement. By comparing current practices with set benchmarks and incorporating peer review mechanisms, institutions can identify gaps and take action to improve curriculum design, teaching effectiveness, and infrastructure. Feedback from stakeholders—including students, faculty, employers, and alumni—is considered crucial for driving reforms and aligning educational outcomes with industry and societal needs.

Summary

Dr. Nassa highlighted the importance of aligning engineering education with global benchmarks, industry needs, and ethical practices. Institutions were encouraged to adopt systematic processes for curriculum development, student assessment, and quality assurance to continuously improve and remain relevant in a rapidly evolving global education landscape.

SESSION 2- Topic: Self-Assessment Report (SAR) & Continuous Quality Improvement in Tier-I and Tier-II Institutions

Presenter: Prof. Sharad Pradhan's

Vision, Mission, and PEOs Definition and Dissemination

Institutes are required to clearly articulate and disseminate their Vision and Mission statements along with Program Educational Objectives (PEOs). These should reflect aspirations, achievable goals, and long-term commitments. The definition process must include stakeholder involvement, and dissemination must ensure awareness via websites, curriculum documents, and institutional posters.

Curriculum Design and Mapping

Curricula must be periodically revised to align with Washington Accord Knowledge Profiles (WKs) and NBA Program Outcomes (POs). Key elements include teaching-learning schemes, credit frameworks, multidisciplinary and interdisciplinary strategies, and academic credit banks like APAAR. Mapping of PEOs with institutional missions should be justified using matrices, and curriculum components need detailed documentation.

Program Outcomes (POs) and Program Specific Outcomes (PSOs)

Institutions must define and map POs and PSOs with clarity. The 12 POs include key skills such as engineering knowledge, ethics, problem-solving, sustainability, teamwork, and communication. PSOs are limited to 2-3 per program and must be context-specific. These are to be mapped against courses using correlation matrices.

Course Outcomes (COs) and Articulation Matrices

COs must be defined for all core courses from semesters 1–8, ideally 5–6 measurable outcomes per course. These should align with POs and PSOs and be presented in articulation matrices using correlation levels (1: Low, 2: Medium, 3: High).

Outcome-Based Teaching-Learning Practices

Teaching should incorporate pedagogy such as real-world case studies, collaborative learning, lab work, capstone projects, and SWAYAM/NPTEL resources. Complex engineering problems must be integrated with SDG targets. Mini/micro projects and seminars are to be aligned with POs and PSOs.

Continuous Quality Improvement (CQI) and Assessment

CQI involves regular assessment of COs, POs, and PSOs through direct and indirect tools—assignments, SEE papers, rubrics, portfolios, and surveys. Institutions must document attainment using statistical approaches and triangulate them via internal and external assessment sources.

Student Performance Metrics

Institutes must track enrolment ratios, academic performance (API), success rates, and outcomes in stipulated periods. This includes tables and statistical benchmarks across batches to maintain transparency in student progression.

Faculty and Resource Evaluation

Includes Student-Faculty Ratio (SFR), qualification index, cadre ratio (professor, associate, assistant), faculty development, industry engagement, and seed funding. All contributions—research, consultancy, MOOC development, and internships—are assessed quantitatively.

Laboratory and Infrastructure Support

Institutions must list and evaluate labs, technical manpower, added facilities for experiential learning, and safety/compliance. Rubrics and checklists should support each aspect.

Summary

Prof. Pradhan's presentation emphasized meticulous documentation, data-driven assessments, and stakeholder engagement. The focus was on transparency, alignment with NBA standards, and robust CQI mechanisms to elevate the quality and accountability of engineering education across Tier-I and Tier-II institutions.

SESSION 3-Topic: NBA Awareness: Ethical Engineering and Sustainability

Presenter: Prof. Shyam Sundar Pattnaik

Vice Chancellor, OSOU; Former Director, NITTTTR; Former Vice Chancellor, BPUT

Engineering as a Socially Driven Discipline

Engineering is not just about technical implementation; it serves as a cornerstone for societal progress and economic development. Prof. Pattnaik emphasized that engineering activity must be aligned with the needs of people, including access to healthcare, sustainable energy, clean water, and communication. It should be carried out ethically, ensuring efficient use of resources, safeguarding health and safety, and considering environmental impacts. The session linked the practice of engineering with the achievement of the 17 UN Sustainable Development Goals (SDGs), positioning engineers as critical agents in global development.

Outcome-Based Education (OBE) Framework

The workshop detailed how Outcome-Based Education (OBE) aims to ensure that students achieve predefined competencies and learning outcomes. It revolves around three levels of outcomes: Program Outcomes (POs), Program Specific Outcomes (PSOs), and Course Outcomes (COs). Institutions must demonstrate how their curricula support these outcomes. Continuous

assessment and feedback are integral to tracking and improving the attainment levels, making OBE a cyclical and quality-focused system.

Program Outcomes (POs) and WKs

The eleven Program Outcomes are structured around three domains of learning: cognitive (knowledge), psychomotor (skills), and affective (attitudes/values). Each PO is aligned with a specific Washington Accord Knowledge Profile (WK). These outcomes define the qualities every engineering graduate should possess, including the ability to analyze complex problems, design solutions, communicate effectively, and commit to lifelong learning. This alignment ensures international relevance and quality.

The 11 Program Outcomes (POs) discussed:

- **PO1: Engineering Knowledge** – Apply knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialization to solve complex engineering problems.
- **PO2: Problem Analysis** – Identify, formulate, review literature, and analyze complex engineering problems using principles of mathematics, natural sciences, and engineering sciences.
- **PO3: Design/Development of Solutions** – Design solutions for complex engineering problems and develop system components or processes meeting specified needs with regard to public health and safety, cultural, societal, and environmental considerations.
- **PO4: Conduct Investigations of Complex Problems** – Use research-based knowledge and research methods including experiment design, data analysis, and interpretation to provide valid conclusions.
- **PO5: Modern Tool Usage** – Create, select, and apply modern engineering and IT tools, with an understanding of their limitations.
- **PO6: The Engineer and Society** – Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues.
- **PO7: Environment and Sustainability** – Understand the impact of engineering solutions in societal and environmental contexts and demonstrate knowledge of sustainable development.
- **PO8: Ethics** – Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- **PO9: Individual and Team Work** – 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 society at large.

- **PO11: Project Management and Finance** – Demonstrate knowledge and understanding of engineering and management principles and apply them to one's own work, as a member and leader in a team.
- **PO12: Life-long Learning** – Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

Performance Indicators and Attainment Assessment

Performance indicators (PIs) break down each PO into measurable tasks. The workshop presented a structured method for evaluating student learning through CO-PO matrices and rubrics. These tools help faculty assess attainment levels and identify gaps. Several methods for CO attainment were explained, ranging from average scoring methods to level-based target achievements, allowing institutions flexibility in evaluation depending on their context.

Complex Engineering Problems

Engineering problems addressed in academic and practical settings are categorized based on complexity. Prof. Pattnaik discussed how complex engineering problems involve multiple, often conflicting issues and require abstract thinking, creativity, and cross-disciplinary knowledge. These are typically not solved using standard approaches and demand innovative design thinking from students.

Outcome-Based Curriculum Design

A key feature of the session was curriculum design guided by OBE principles. Prof. Pattnaik described how a well-structured curriculum integrates theoretical concepts with real-world applications. It should allow students to engage with emerging technologies, perform hands-on experiments, and consider ethical, social, and environmental dimensions. The curriculum must also be flexible and diverse to cater to individual student interests and strengths.

PEOs and Institutional Mission Mapping

Program Educational Objectives (PEOs) define long-term goals for graduates. The workshop highlighted how institutions should map PEOs to their mission statements, ensuring alignment with the vision and strategic goals. A matrix approach was recommended to visualize this mapping, promoting institutional coherence and accountability in achieving educational outcomes.

Assessment and Evaluation Systems

The workshop stressed reforming traditional examination methods to make them more reflective of student understanding and skills. Assessment tools should be designed using action verbs from Bloom's Taxonomy. Rubrics (analytic, holistic, and developmental) were recommended for consistent evaluation. Model question papers and evaluated scripts serve as tools for continuous assessment and curriculum refinement.

Continuous Quality Improvement (CQI)

Continuous improvement is the backbone of OBE. Prof. Pattnaik outlined the need for institutional mechanisms like academic audits, feedback systems, and performance reviews. These processes help track the effectiveness of teaching, curriculum, and learning outcomes. Institutions must act on data collected from assessments to close the loop and enhance the quality of education.

Summary

In conclusion, Prof. Pattnaik's session provided a comprehensive roadmap for implementing OBE in engineering education. It underscored the importance of structured curriculum, meaningful assessment, performance mapping, and ethical responsibility. The insights shared encouraged institutions to commit to a dynamic, student-centric educational model that is both globally aligned and socially responsive.

Conclusion

The workshop reinforced the importance of evolving higher education through OBE, accreditation, and ethical practices. Continuous quality improvement, stakeholder feedback, and alignment with global sustainability goals were highlighted as fundamental to preparing competent, socially responsible engineers.

Glimpse of the event:





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and
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Jointly organize*

**Awareness Workshop on
Outcome Based Education and Accreditation (OBE&A)**

29th March 2025
10:00 AM Onwards

Patron



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Hon'ble Vice Chancellor,
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Resource Persons



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For Registration



<https://forms.gle/cWXPzCyPdXe4smZq9>

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