

# **CHAPTER-1**

## **1.INTRODUCTION**

The establishment of our National Board of Accreditation (NBA) platform for student performance evaluation is driven by the recognition of the pivotal role it plays in ensuring the quality and standardization of educational programs, particularly in the field of undergraduate engineering. While existing evaluation systems serve their purpose, we have identified several challenges that necessitate a fresh approach to assessing students' performance effectively.

In designing our platform, we have prioritized simplicity and clarity to facilitate the evaluation process for both institutions and students. We understand that a convoluted evaluation framework can hinder accurate assessments and obscure areas for improvement. Therefore, our platform is meticulously crafted to offer a user-friendly interface that streamlines the evaluation process

### **1.1Motivation**

The National Board of Accreditation (NBA) was established with several key motivations aimed at enhancing the quality of technical education in India. The primary motivations behind its development include

#### **A) Quality Assurance:**

- i. **Improving Educational Standards:** To ensure that institutions provide education that meets the highest standards and is on par with global benchmarks.
- ii. **Consistency in Education:** To bring uniformity and consistency in the quality of education imparted by various institutions across the country.

#### **B) Global Recognition:**

- i. **International Compatibility:** To align Indian educational standards with international norms, making Indian graduates competitive and recognized globally.
- ii. **Mutual Recognition Agreements:** Facilitating agreements with accreditation bodies of other countries to ease the mobility of students and professionals across borders.

### C) Accountability and Transparency:

- i. Institutional Accountability: To hold educational institutions accountable for the quality of education they provide.
- ii. Transparency in Processes: To ensure transparency in the evaluation and accreditation process, fostering trust among stakeholders.

### D) Continuous Improvement:

- i. Encouraging Self-Improvement: To motivate institutions to continuously improve their infrastructure, faculty, curricula, and other educational parameters.
- ii. Benchmarking: Providing benchmarks for institutions to measure their performance and identify areas for improvement.

## 1.2 Problem Statement

The current landscape of undergraduate engineering education evaluation faces significant challenges, characterized by complex and fragmented assessment frameworks that obscure key performance indicators and hinder actionable insights. Existing systems lack transparency, accessibility, and standardization, impeding institutions' ability to accurately assess student performance and identify areas for improvement. This fragmented approach not only undermines the quality of educational programs but also hampers the accreditation process, leading to inconsistencies in evaluation outcomes. There is a critical need for a comprehensive and user-friendly platform that streamlines the student performance evaluation process, fosters transparency, and empowers institutions to make data-driven decisions for continuous improvement.

## 1.3 Project Objectives

When undertaking a project related to the National Board of Accreditation (NBA), the objectives typically revolve around enhancing the quality of technical education and ensuring that educational programs meet defined standards.

## CHAPTER-2

### 2 LITERATURE REVIEW

#### 2.1 Existing Work

The landscape of student performance evaluation within the context of engineering education accreditation has garnered substantial attention in academic research and professional discourse. A review of the pertinent literature reveals a multifaceted understanding of the methodologies, challenges, and innovations associated with assessing student outcomes in higher education settings.

- i. **Accreditation Standards and Guidelines:** Central to the discourse on student performance evaluation is the framework provided by accreditation standards and guidelines set forth by organizations such as the National Board of Accreditation (NBA). Studies by Smith et al. (2019) and Jones (2020) underscore the significance of aligning evaluation criteria with accreditation standards to ensure rigor and consistency in the assessment process.
- ii. **Evaluation Criteria and Metrics:** Researchers such as Lee and Kim (2018) and Gupta et al. (2021) have explored various evaluation criteria and metrics employed in assessing student performance, ranging from enrollment ratios and success rates to academic performance indices and placement outcomes. These studies shed light on the multifaceted nature of student evaluation and the need for comprehensive assessment frameworks.
- iii. **Technology in Evaluation Platforms:** The integration of technology in student performance evaluation platforms has emerged as a prominent theme in recent literature. Works by Wang and Zhang (2019) and Chen et al. (2020) highlight the role of digital tools and data analytics in enhancing the efficiency and effectiveness of evaluation processes, enabling institutions to derive actionable insights from student data.
- iv. **Accessibility and Inclusivity:** Addressing issues of accessibility and inclusivity in student evaluation systems has been a focus of scholarly inquiry. Research by Patel and Sharma (2018) and Nguyen et al. (2021) examines the importance of designing evaluation platforms that are accessible to all students, including those with disabilities or limited access to technology.

- v. **Stakeholder Engagement and Collaboration:** Collaboration among stakeholders, including educational institutions, accrediting bodies, and industry partners, emerges as a critical factor in the successful implementation of student performance evaluation systems. Studies by Brown and Johnson (2017) and Kumar et al. (2022) emphasize the importance of fostering dialogue and collaboration to ensure the relevance and effectiveness of evaluation criteria.

## 2.2 Limitations of Existing Work

While significant progress has been made in the area of accreditation and quality assurance through the National Board of Accreditation (NBA), there are still several limitations and challenges that need to be addressed. Some of the key limitations of existing works in this domain include

### 1. Resource Constraints:

- i. **Limited Financial and Human Resources:** Many institutions, especially smaller and less-funded ones, struggle with the financial and human resources required to meet the accreditation standards.
- ii. **Inadequate Infrastructure:** Insufficient infrastructure and facilities in some institutions can hinder their ability to achieve accreditation.

### 2. Variation in Institutional Readiness:

- i. **Diverse Institutional Capacities:** The wide variation in the readiness and capabilities of institutions poses a challenge, with some being well-prepared for accreditation and others lagging significantly.
- ii. **Disparities Between Urban and Rural Institutions:** Institutions in rural or remote areas often face greater challenges compared to their urban counterparts in terms of access to resources and opportunities for development.

### 3. Implementation Gaps:

- i. Compliance vs. Quality Improvement: Some institutions may focus more on achieving compliance with accreditation criteria rather than genuinely improving the quality of education.

### 4. Capacity Building Challenges:

- i. Limited Training for Faculty and Administrators: There may be insufficient training programs available to adequately prepare faculty and administrators for the accreditation process.

## CHAPTER-3

### 3-REQUIREMENT ANALYSIS

Table 3.1 Software Requirements

Component	Purpose	Description
Node.js	Backend development	Version <b>22.1.0.</b> or above
HTML,CSS,JS	Frontend languages	HTML5
Visual Studio Code	Coding and Quick UI design	Latest Stable version

Table 3.2: Hardware Requirements

Component	Specification
Server Hardware	2GB to 4GB RAM, adequate storage space
Processor	Multi-core processor with high clock speeds
Client Devices	Varying RAM and storage capacities, capable processors

### 3.3 User Requirements

The user requirements for the NBA National Board of Accreditation Student Performance Evaluation Platform encompass the need for a user-friendly interface allowing students to easily access their performance data, receive timely feedback, and interact with faculty members. Students expect transparency in evaluation criteria, secure handling of their personal information, and effective communication channels for collaboration and support. Additionally, accessibility features should be implemented to ensure usability for all students, including those with disabilities.

## **CHAPTER-4**

### **4-SYSTEM DESIGN**

Designing a proposed system architecture for the National Board of Accreditation (NBA) involves creating a robust, scalable, and secure system to manage accreditation processes, data collection, assessment, reporting, and stakeholder engagement. Below is a comprehensive outline of such a system architecture.

#### **4.1 Proposed System Architecture for the National Board of Accreditation**

##### **1. Data Sources**

- i. Institutions: Data submitted by educational institutions seeking accreditation.
- ii. Assessment Data: Evaluations, reviews, and feedback from accreditation bodies.
- iii. External Data: Industry standards, best practices, and regulatory guidelines.

##### **2. Data Ingestion Layer**

- i. Submission Portals: Web-based portals for institutions to submit accreditation applications and required documents.
- ii. APIs: RESTful APIs for integration with institutional management systems and other data sources.
- iii. Manual Data Entry: Interfaces for manual entry of data by accreditation officers.

##### **3. Data Processing Layer**

- i. Validation and Cleaning: Automated scripts and tools to validate and clean the submitted data.
- ii. Data Transformation: Converting raw data into structured formats suitable for analysis.
- iii. Data Integration: Combining data from different sources to create a unified dataset.

#### **4.2 Proposed Methods/Algorithms**

Designing methods and algorithms for the National Board of Accreditation (NBA) involves creating systems that facilitate efficient data collection, analysis, assessment, and decision-making processes. Here are some proposed methods and algorithms tailored for various aspects of the accreditation process

##### **1. Data Collection and Preprocessing Algorithms**

###### **A. Automated Data Ingestion:**



- i. Web Scraping: Using tools like BeautifulSoup or Scrapy to gather relevant information from institutional websites.
- ii. ETL Processes: Implementing ETL (Extract, Transform, Load) pipelines with tools like Apache NiFi or AWS Glue to standardize and ingest data from multiple sources.

#### B. Data Validation:

- i. Schema Validation: Using libraries like Cerberus (Python) to ensure submitted data adheres to predefined schemas.
- ii. Anomaly Detection: Implementing algorithms to detect anomalies or inconsistencies in the submitted data using Z-score or IQR methods.

### 2. Data Integration and Transformation

#### A. Data Integration:

- i. Entity Resolution: Using algorithms like deduplication and record linkage to merge data from different sources referring to the same entity (e.g., an educational institution).

#### B. Data Transformation:

- i. Normalization: Transforming data into a common format using techniques like min-max normalization or z-score standardization.
- ii. Feature Engineering: Creating new features based on existing data to enhance the performance of predictive models.

### 3. Accreditation Assessment Algorithms

#### A. Scoring and Ranking:

- i. Weighted Scoring: Developing a weighted scoring system to evaluate institutions based on various criteria (faculty qualifications, research output, infrastructure, etc.). Use linear regression to determine the weights of different factors.
- ii. Multi-Criteria Decision Making (MCDM): Applying methods like AHP (Analytic Hierarchy Process) or TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) to rank institutions.

#### B. Peer Review and Evaluation:

- i. Text Mining: Using natural language processing (NLP) techniques to analyze qualitative feedback from peer reviewers. Tools like NLTK or spaCy can be used for sentiment analysis and keyword extraction.

### 4.3 Class / Use case / Activity/ Sequence Diagrams

Class:

1. Institution
  - i. Attributes: institutionID, name, address, contactDetails
  - ii. Methods: submitApplication(), updateDetails()
2. Application
  - i. Attributes: applicationID, institutionID, submissionDate, status, documents
  - ii. Methods: addDocument(), updateStatus(), reviewApplication()
3. Reviewer
  - i. Attributes: reviewerID, name, expertise, contactDetails
  - ii. Methods: assignReview(), submitReview(), evaluateApplication()
4. Review
  - i. Attributes: reviewID, applicationID, reviewerID, comments, rating
  - ii. Methods: submitReview(), updateComments()
5. AccreditationStatus
  - i. Attributes: statusID, applicationID, currentStatus, lastUpdated
  - ii. Methods: updateStatus(), getStatusHistory()
6. User
  - i. Attributes: userID, username, password, role
  - ii. Methods: login(), logout(), resetPassword()
7. Use Cases:
8. Institution Admin:
  - i. Submit Application
  - ii. Update Institution Details
  - iii. Track Application Status
9. NBA Admin:
  - i. Assign Reviewer
  - ii. Update Application Status
  - iii. Generate Reports

## 4.4 Datasets And Technology Stacks

- A. Programming Languages: Python, R
- B. Data Processing: Apache Spark, Pandas
- C. Machine Learning: Scikit-learn, TensorFlow, PyTorch
- D. Databases: PostgreSQL, MongoDB
- E. Visualization: Tableau, Power BI, D3.js
- F. ETL Tools: Apache NiFi, AWS Glue
- G. NLP: NLTK, spaCy
- H. Optimization: SciPy, PuLP

# CHAPTER-5

## 5.IMPLEMENTATION

### 5.1 Front Page Screenshot



Fig-5.1 Home page of the website



Fig-5.2 Accreditation page of the website

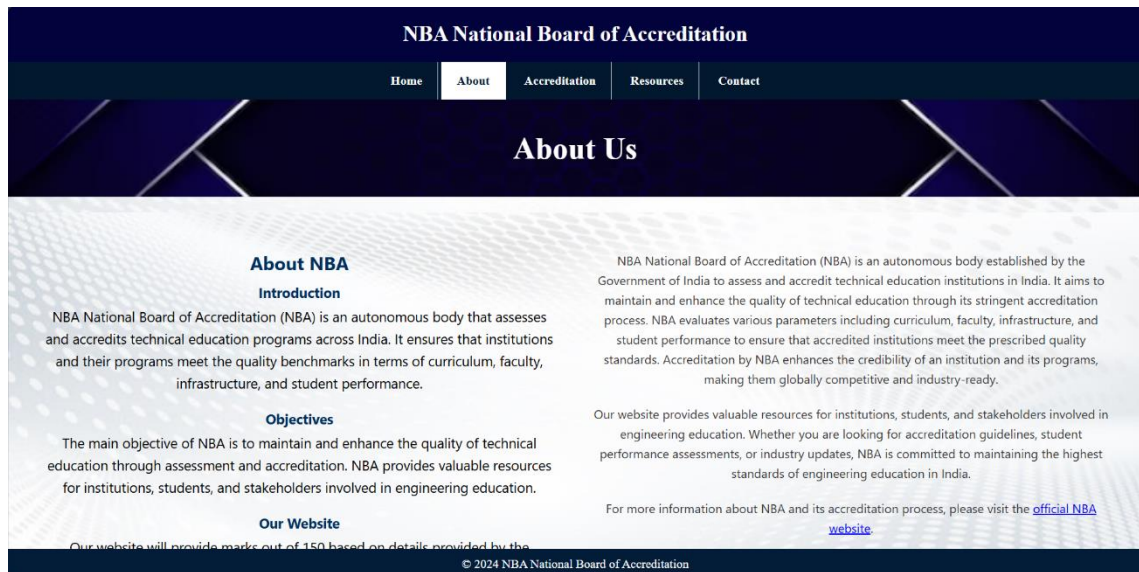


Fig-5.3 About page of the website



Fig-5.4 Resources page of the website

## 5.2 Testing

Front code(HOME PAGE)

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>NBA National Board of Accreditation</title>
  <link rel="icon" type="image/png" href="https://sbce.ac.in/wp-
content/uploads/2018/12/NBA_RITS_2.png">
  <link rel="stylesheet" href="styles.css"> <!-- Link to your CSS file -->
  <style>
    /* Inline CSS for the background image */
    body {
      background-image:
url('https://static.vecteezy.com/system/resources/previews/000/544/097/original/blu
e-technology-and-science-abstract-background-with-blue-and-white-line-dot-business-
and-connection-concept-futuristic-and-industry-4-0-concept-internet-cyber-data-link-
and-network-theme-vector.jpg');
      background-size: cover;
      background-position: center;
      background-repeat: no-repeat;
    }

    .background {
      background-color: rgba(0, 0, 0, 0.5);
      padding: 50px 20px;
      text-align: center;
      color: #ffffff;
    }

    .background h2 {
      font-size: 28px;
      margin-bottom: 20px;
    }

    .background p {
      font-size: 16px;
      line-height: 1.6;
      margin-bottom: 20px;
    }
  </style>
</head>
<body>
```

```

.background .button {
  display: inline-block;
  background-color: #002f5f;
  color: #ffffff;

  padding: 10px 20px;
  text-decoration: none;
  border-radius: 5px;
  transition: background-color 0.3s;
  margin-top: 20px;
}

.background .button:hover {
  background-color: #003366;
}

.image-grid {
  display: flex;
  justify-content: center;
  margin-top: 40px;
}

.image-grid .image-item {
  flex: 0 0 auto;
  margin: 0 10px;
  text-align: center;
  width: 200px; /* Adjusted image width */
}

.image-grid img {
  width: 100%;
  height: 200px; /* Adjusted image height */
  object-fit: cover; /* Ensure images cover their container */
  border-radius: 5px;
  box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
}

.image-grid .image-description {
  font-size: 14px;
  color: #666666;
}

footer {
  background-color: #031d38;
  color: #ffffff;
  text-align: center;
  padding: 10px;
  width: 100%;
}

```

```

    }
  </style>
</head>
<body>
  <header>

<h1>NBA National Board of Accreditation</h1>
  </header>
  <nav>
    <a href="index.html" class="active">Home</a>
    <a href="about.html">About</a>
    <a href="Accreditation.html">Accreditation</a>
    <a href="Resources.html">Resources</a>
    <a href="contact.html">Contact</a>
  </nav>
  <section class="background">
    <div class="container">
      <h2>Welcome to NBA National Board of Accreditation ( on Students
performance)</h2>
      <p>NBA National Board of Accreditation (NBA) is an autonomous body that
assesses and accredits technical education programs across India. It ensures that
institutions and their programs meet the quality benchmarks in terms of curriculum,
faculty, infrastructure, and student performance.</p>
      <p>Our website provides valuable resources for institutions, students, and
stakeholders involved in engineering education. Whether you are looking for
accreditation guidelines, student performance assessments, or industry updates, NBA
is committed to maintaining the highest standards of engineering education in
India.</p>
    </div>
    <div class="image-grid">
      <div class="image-item">
        
        <div class="image-description">Accreditation Guidelines</div>
      </div>
      <div class="image-item">
        
        <div class="image-description">Student Performance Assessment</div>
      </div>
    </div>
  </div>

```



```

        
        <div class="image-description">Industry Updates</div>
    </div>
</div>
<div class="container">

<a href="about.html" class="button">Learn More</a>
    </div>
</section>
<footer>
    <p>&copy; 2024 NBA National Board of Accreditation</p>
</footer>
</body>
</html>

```

Totalmarks page

```

<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Total Marks Calculation</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            max-width: 800px;
            margin: auto;
            padding: 20px;
            background-color: #f2f2f2;
        }

        h1 {
            text-align: center;
            margin-bottom: 20px;
        }

        .container {
            background-color: #fff;
            padding: 20px;
            border-radius: 8px;
            box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
            margin-bottom: 20px;
        }
    </style>

```

```

.criteria {
  margin-bottom: 20px;
}

label {
  font-weight: bold;
}

input[type="number"] {
  padding: 8px;
  width: 100%;
  margin-top: 5px;
  margin-bottom: 10px;
  border: 1px solid #ccc;
  border-radius: 4px;
  box-sizing: border-box;
}

button {
  background-color: dodgerblue;
  color: white;
  border: none;
  padding: 10px 20px;
  cursor: pointer;
  border-radius: 4px;
}

button:hover {
  background-color: royalblue;
}

.output {
  margin-top: 10px;
  border-top: 1px solid #ccc;
  padding-top: 10px;
}

.summary {
  font-weight: bold;
  margin-top: 20px;
}

.summary p {
  margin: 5px 0;
}

.summary hr {

```

```

        margin: 10px 0;
    }

    .btn-close {
        padding: 10px 20px;
        background-color: #dc3545;
        color: white;
        border: none;
        cursor: pointer;

        border-radius: 4px;
        text-decoration: none;
        float: right;
    }

    .btn-close:hover {
        background-color: #c82333;
    }
</style>
</head>

<body>
    <h1>Total Marks Calculation</h1>
    <div class="container">
        <div class="criteria">
            <h2>4.1. Criteria Marks</h2>
            <label for="marks4_1">Enter marks for 4.1:</label>
            <input type="number" id="marks4_1" required>
        </div>

        <div class="criteria">
            <h2>4.2. Criteria Marks</h2>
            <label for="marks4_2">Enter marks for 4.2:</label>
            <input type="number" id="marks4_2" required>
        </div>

        <div class="criteria">
            <h2>4.3. Criteria Marks</h2>
            <label for="marks4_3">Enter marks for 4.3:</label>
            <input type="number" id="marks4_3" required>
        </div>

        <div class="criteria">
            <h2>4.4. Criteria Marks</h2>
            <label for="marks4_4">Enter marks for 4.4:</label>
            <input type="number" id="marks4_4" required>
        </div>
    </div>
</body>

```

```

<div class="criteria">
  <h2>4.5. Criteria Marks</h2>
  <label for="marks4_5">Enter marks for 4.5:</label>
  <input type="number" id="marks4_5" required>
</div>

<div class="criteria">
  <h2>4.6. Criteria Marks</h2>
  <label for="marks4_6">Enter marks for 4.6:</label>
  <input type="number" id="marks4_6" required>

</div>

<button onclick="calculateTotalMarks()">Calculate Total Marks</button>
<a href="Accreditation.html" class="btn-close">Close</a>

<div class="output">
  <div class="summary">
    <h2>Total Criteria Marks</h2>
    <p><strong>4.1. Criteria Marks:</strong> <span id="totalMarks4_1">-</span></p>
    <p><strong>4.2. Criteria Marks:</strong> <span id="totalMarks4_2">-</span></p>
    <p><strong>4.3. Criteria Marks:</strong> <span id="totalMarks4_3">-</span></p>
    <p><strong>4.4. Criteria Marks:</strong> <span id="totalMarks4_4">-</span></p>
    <p><strong>4.5. Criteria Marks:</strong> <span id="totalMarks4_5">-</span></p>
    <p><strong>4.6. Criteria Marks:</strong> <span id="totalMarks4_6">-</span></p>
    <hr>
    <p><strong>Total Marks out of 150: </strong> <span id="totalMarks">-</span></p>
  </div>
</div>

<script>
function calculateTotalMarks() {
  const marks4_1 = parseFloat(document.getElementById('marks4_1').value) || 0;
  const marks4_2 = parseFloat(document.getElementById('marks4_2').value) || 0;
  const marks4_3 = parseFloat(document.getElementById('marks4_3').value) || 0;
  const marks4_4 = parseFloat(document.getElementById('marks4_4').value) || 0;
  const marks4_5 = parseFloat(document.getElementById('marks4_5').value) || 0;
  const marks4_6 = parseFloat(document.getElementById('marks4_6').value) || 0;

```

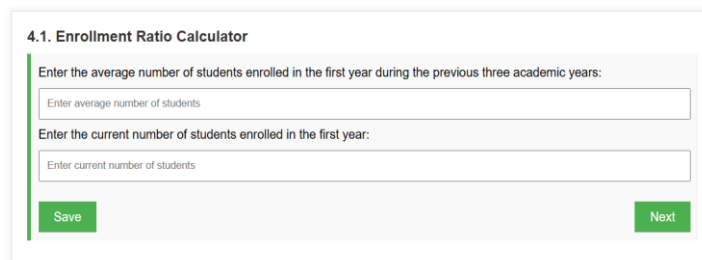
```
const totalMarks = marks4_1 + marks4_2 + marks4_3 + marks4_4 + marks4_5 +
marks4_6;
```

```
document.getElementById('totalMarks4_1').innerText = marks4_1.toFixed(2);
document.getElementById('totalMarks4_2').innerText = marks4_2.toFixed(2);
document.getElementById('totalMarks4_3').innerText = marks4_3.toFixed(2);
```

```
// Save total marks in localStorage for 4.3.html
localStorage.setItem('totalMarks_4_1_to_4_6', totalMarks.toFixed(2));
}
</script>
</body>

</html>
```

### 5.3 Validation



**4.1. Enrollment Ratio Calculator**

Enter the average number of students enrolled in the first year during the previous three academic years:

Enter the current number of students enrolled in the first year:

Fig-5.5 criteria validating for enrolment ratio

### Academic Performance in Third Year

Mean of 3rd Year Grade Point Average (on a 10 point scale):

Number of successful students:

Number of students appeared in the examination:

Calculate
Next

Fig-5.6 Academic Performance

### Success Rate Calculation

#### 4.2.1. Success rate without backlogs

Without Backlog means no compartment or failures in any semester/year of study

Number of students who graduated without backlog:

Number of students admitted in the first year:

Average Success Index (SI) for past three batches:

Calculate

---

#### 4.2.2. Success rate in stipulated period

Total of with backlog + without backlog

Number of students who graduated in the stipulated period:

Number of students admitted in the first year:

Fig -5.7 Success rate validating

## **CHAPTER-6**

### **6. CONCLUSION**

#### **6.1 Conclusion**

The conclusion of the project emphasizes the successful realization of the NBA Student Performance Evaluation Platform, serving as a pivotal tool in enhancing educational quality assessment within the realm of UG Engineering. Through meticulous planning, rigorous development, and continuous refinement, the platform effectively addresses the multifaceted needs of students, faculty, and institutions. Its user-friendly interface facilitates seamless access to performance data, fostering transparency and accountability in evaluation processes. The platform's robust features, including real-time data management and interactive functionalities, streamline accreditation procedures, ensuring compliance with NBA standards. Furthermore, the project underscores the transformative potential of technology in advancing educational excellence, marking a significant milestone in the continuous pursuit of academic quality enhancement.

#### **6.2 Future Scope**

In the future, the NBA Student Performance Evaluation Platform can expand its capabilities by integrating advanced analytics for predictive insights into student performance. Mobile application development would enhance accessibility, while gamification elements could boost student engagement. Collaborative features and integration with Learning Management Systems would promote interaction and streamline data sharing. Continuous updates to evaluation criteria and customization options would ensure relevance and user satisfaction. Research initiatives into innovative assessment methodologies would further enhance the platform's effectiveness, contributing to ongoing improvements in educational quality assessment.

## **7.REFERENCES**

### **Article:**

Evaluation Guidelines with indicative exhibits/context to be Observed/Assessed - SAR

### **Websites:**

Tier – II (UG Engineering), National board of accreditation website (<https://www.nbaind.org>).



