

# Assessment and Evaluation System in Engineering Education of UG Programmes at Premier Institutes (NITs) in India - A Review of Literature

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## ABSTRACT

Assessment is one of the most critical dimensions in engineering education process; it focuses not only on identifying how many of the predefined education goals and objectives/outcomes have been achieved but also works as a feedback component for educators to upgrade their teaching practices. The assessment can be seen as a link that it forms with other education processes. Lamprianou et al. (2009) point out that assessment is associated with the educational objectives of "evaluation, diagnosis, guidance, selection, placement, administration, prediction or grading.

Assessment is one main factors that contribute to a high quality teaching and learning environment and student's performance as whole. It also makes clearer what teachers expect from students (Biggs et al., 1999). The perceived difficulty in this process is how assessment system, approaches and schemes can be standardized and adapted across the premier institutes (NITs) of in the country. Credit system has been used widely by many HEIs in India for over 20 years but no nationally agreed and rationalized framework of credit and Credit Transfer and Accumulation System is developed.

The purpose of the literature review is to outline research studies in the assessment and evaluation systems being practiced and to highlight the studies that can be used in the research project undertaken.

Specifically, the literature review attempts to address the following research questions: What researches are undertaken nationally and internationally into the assessment system in higher education, especially engineering education? What are the key findings from these researches? What are the limits (delimitations) of these researches? Are there research findings could be applied to engineering education at UG in NITs in India? Are there any prime concern for future research in this area?

From this literature review, it is apparent that a very few number of studies have been conducted in higher education institutions but no research was found in the context of Engineering Education specific to UG programmes and NITs. However, many innovations are on the way to improvise the assessment and evaluation mechanisms in the engineering education especially in the context of Outcome Based Education (OBE).

**KEYWORDS:** Engineering Education, Assessment, Evaluation, Credits, National Institute of Technology (NITs)

## INTRODUCTION

Assessment and evaluation has a critical role in the education process. For an assessment system to be effective, it is necessary first to identify the criteria or the standards that will be used for student's evaluation. Having considered that, the educator should proceed by choosing the best fit assessment techniques that is for addressing these criteria (Bull & McKenna, 2003). There is a number of methods of assessment, which can be employed with different mechanisms such as self and peer assessment and automated tools. Firstly, a teacher should choose the standardized system of assessment and then the appropriate

mechanism to conduct the assessment (Bull & McKenna, 2003).

There is broad agreement among researchers that a multi-faceted approach to assessment in institute is necessary. Ragonis (2012) gives three reasons for this: a) different type of questions highlight different learning aspects b) different type of questions require students to employ a different type of skills and c) different type of questions enable teachers to offer a variety of tools for assessment and, thus, making it more interesting to students. Yadav et al. (2015) recommend

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the development of valid and reliable assessment tasks and the development of an online source that would enable teachers to access and share these tasks.

Credit system has been used widely by many HEIs in India for over 20 years but no nationally agreed and rationalized framework of credit and Credit Transfer and Accumulation System is developed on the other hand many European ASEM member countries have standardized credit range for UG and PG programmes (Higher education in Europe 2010).

Student performance generally reflected through the assessment system and mechanism in engineering education. Traditionally, it is interpreted that those who have secured good marks/grades in the assessment, their performance are good accordingly, but in many cases this assumptions does not prevailing under the umbrella of outcome based education. In engineering education, student assessment must dealing with marks and aligned with the qualitative performance of the students in the forms of outcomes at each level.

In our country (India), there are 31 NITs, which are known as "premier institutes", having about 19,000 students are intake and around 15+ institutes of national importance such as IITs. They are having their own systems of students' assessment now. The weightage of credit allocation (160 to 300) to each discipline or branch varied institutes to institute. However very few NITs having similar credit (200) allocation to each discipline. Each institute adopting different assessment tools or techniques for evaluation of student progress.

Since, student assessment system used in premier institutions varies on various dimensions such as, allocation of overall marks on practical and theory, conduction methods of examination, mode of credit allocation for the course in entire semester or program. There is a difference in marks allocation in each form of assessment tools or techniques (e.g. mid-term test, assignments, quizzes, attendance, end-term test etc). This variation is not rationalize or justified, since programs are of the same duration with the same entry qualification or criteria and also similar mandates of institutions. Currently assessment systems in these institutes are more flexible and operated with more autonomy with institute and teachers.

Due to this variation and flexibility in student assessment system, students who are graduating in these institutes are acquiring different set of abilities and skills related to the program. Even though they are acquiring same degree of qualification but possessing different levels of abilities. At stage of competitive evaluation of students in industries, it seems that students having the same academic grades or scores are inferring in terms of their performance and knowledge. It is also questionable that the assessment strategies which universities or institutes are adopted are capable for improving the required skills and abilities in students to fulfil the demand of industries.

### **Student assessment and evaluation in Global perspective**

A significant objective of each engineering educational institution is integrating a process of good assessment practices into academic programmes (J. McGourty, 1999).

Many engineering departments are giving inadequate consideration to the effective implementation of good assessment practices and reprehend by their external quality reviewers as well as their students (L. McDowell et al. 2004). Christoforidou et al. (2014) enunciate that researchers need to distinguish and identify such challenges for implementation of effective assessment system.

In J. A. Shaeiwitz (1996), to implement a good assessment plan, a paradigm shift in engineering faculty culture is needed so that faculty members will communicate more about expectations from course content and student learning.

In Europe, assessment and learning analytics are in a central point in higher education institutions. Continuous and formative assessments are applied as motivation to the students which remove anxiety. Engineers' education is rapidly changing from a traditional chalk-and-talk approach that emphasizes knowledge acquisition through project or problem based activities is increased (N P Subheesh et al., 2018). Technology based e-assessment tools such as multiple-choice assessments, computer based standardised tests and adaptive tests are widely applied at classroom level to improve creativity, problem-solving skills and critical thinking of students (Gibson, Ivan, 2002).

In US, According to the Boud (2000), traditional prevailing assessment practices in higher education are unable to develop lifelong learning in students, so summative assessment is moving towards to formative assessment. Now, formative assessment system linked with active learning to enable the faculty to identify student performance, which increases the level of active learning skills among students. Formative assessment can serve as an instrument in building a better management or methodology of evaluation used at the tertiary level in building a great future generation (Chan et al. 2014).

In the Asia-Pacific Region, the enthusiasm for assessment for learning has grown in recent years. According to Ministry of Education, Singapore, "bitesized" modes of assessment such as topical or chapter test used for providing feedback about student learning regularly. Also introduce holistic assessment system to improve student learning outcomes (Klenowski, Val. 2009).

In China, the main focus of education curriculum is the ideological development of student. However skill development is taking as a key component to fulfil labour market demands and quality assurance in higher education policy (Education in China- A SNAPSHOT, 2016).

Japan has reached at the phase of "universalization" of higher education. Also emphasize that a productive assessment framework is useful to evaluate quality of learning and learning outcomes as global perspective. To enhance accountability and quality of learning, third-party evaluation system was added with existing self-monitoring and self-evaluation systems (Yamaguchi, et al. 2016).

M. Clarke (2012) gives an outline of what is generally significant for building an increasingly viable evaluation framework. Also extricate the nations' encounters, proficient testing benchmarks, standards and rules from the current

investigation that supports better quality of education and learning. Types and purpose of assessment process and quality of those activities are taken as key dimensions of assessment process. Different assessment types such as classroom test, examinations and large scale system level assessments are discussed. Reliability and validity are considered as technical issues to review quality of assessment.

To review these key dimensions, data are collected by using questionnaires and evaluate by using standardized rubrics. This framework helps nations to distinguish the key quality drivers that should be tended to reinforce the quality and utility of the data delivered by the different exercises in their assessment work. The structure furnishes approach creators and others with a proof based structure for conversation and agreement working around needs and key contributions for their assessment framework.

S. Xiao et al. (2012) emphasize in this paper about the development of learning oriented methods of assessment. They also suggested designing an assessment support system in the phase of transition in higher education. The entire paper is focus towards re-engineering of assessment activities in engineering programs now especially at UG degree programs/courses now.

#### Student assessment and evaluation in Indian Context

Aithal et al. (2016) discussed and analyse Choice Based Credit System in India and its basic features. Based on these features, 2 analyses, namely, SWOC Analysis (Strength, Weakness, Opportunities and Challenges) and ABCD (Advantages, Benefits, Constraints, and Disadvantages). The fundamental intention is to expand academic quality in all characteristics, directly from the educational plan to the getting the hang of teaching procedure to assessment frameworks and examinations. However, numerous strategies are trailed by various colleges of the country over in assessment, evaluation and grading system. The accomplishment of the choice based credit system is appears by all accounts are subjectively unrivaled. Results show that comparative analysis using SWOC and ABCD has ranked ABCD analysis more and more.

Dr. M. M. Gandhi (2012), in his paper highlights very recent initiatives in India pertaining to the mandatory assessment and accreditation with specific and analytical references and overview from the pending The National Accreditation Regulatory Authority for Higher Educational Institutions Bill, 2010 as also the UGC Regulations, 2012, making 'Mandatory Assessment and Accreditation' for each Higher Educational Institution in India.

Shah Tarala (1997), the creation of national systems for the assessment of quality in higher education has been a major feature of developments in many countries. There are now over 70 quality assessment agencies around the world which have responsibility of undertaking a review of the quality of higher education provision in their respective countries.

#### Conclusion

Assessment' and 'evaluation' are the integral parts of the engineering education. These components have directly incorporated with quality assurance in engineering education system. Literature reviewed suggests that better

assessment and evaluation practices require certain knowledge and skills about types and methods of assessment and evaluation. It is found that most of the engineering faculty members do not have concrete knowledge about 'assessment' and 'evaluation' types and standard systems of assessment methods. Further, it is argued that engineering educators, especially at NITs level, are not equipped with standards in assessment systems and associated practices.

Comments on students' performances are essential because it helps them to know their performance. In this background, the paper critically analyses assessment and evaluation practices in engineering education setup across the globe and India in particular.

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