Examination Reform Policy

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GANESH INSTITUTE OF MANAGEMENT STUDIES

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ODISHA

Introduction

In the era of globalization, there is a need to remain competitive to respond to challenges faced day to day basis. To respond to these challenges, future engineering graduates need to be technically superior as well as be strong in soft and professional.

As the examination or assessment plays an important role in improving the qualit y of education. In addition to the student's assessment in terms of grades, examinations need to ensure that the desired learning outcomes are achieved. The program outcomes and objectives are very crucial in nature and their achievement need to be proved through accurate and reliable assessment methods.

To improve the quality of examination system, reforms are crucial and need to be adopted on a regular basis.

Outcome based Education and Assessment

I Mapping POs to Assessments/Examinations:

Graduate attributes (GAs) articulate the generic abilities to be looked for in a graduate of any undergraduate degree program. They form the Program Outcomes (POs) that reflect the skills, knowledge and abilities of graduates regardless of the field of study. This does not mean that POs are necessarily independent of disciplinary knowledge —rather; these qualities may be developed in various disciplinary contexts.

In outcome-based education, a "design down" process is employed which moves from POs to Course Outcomes (COs) and outcomes for individual learning experiences. Outcomes at each successive level need to be aligned with, and contribute to, the program outcomes.

Courses are the building blocks of a program. Teaching strategies, learning activities, assessments and resources should all be designed and organized to help students achieve the learning outcomes at the course level. In the assessment activities, students demonstrate their level of achievement of the course learning outcomes. In a constructively aligned program, the courses are carefully coordinated to ensure steady development or scaffolding from the introduction to mastery of the learning outcomes, leading to achievement of the intended POs. For the effectiveness of the program, the achievement of POs is crucial which needs to be proven through accurate and reliable assessments.

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2. Clarity about POs:

POs give useful guidance at the program level for the curriculum design, delivery and assessment of student learning. However, they represent fairly high-level generic goals that are not directly measurable. Real observability and measurability of the POs at course level is very difficult. To connect high-level learning outcomes (POs) with course content, course outcomes and assessment, there is a necessity to bring further clarity and specificity to the program outcomes. This can be achieved through the following two-step process of identifying Competencies and Performance Indicators (PI).

(1) Identify Competencies to be attained: For each PO defines competencies - different abilities implied by program outcome statement that would generally require different assessment measures. This helps us to create a shared understanding of the competencies we want students to achieve. They serve as an intermediate step to the creation of measurable indicators.

Competencies

1. Demonstrate an ability to define a complex, open-ended problem in engineering terms.
2. Demonstrate an ability to generate a diverse set of alternative design solutions.
3. Demonstrate an ability to select the optimal design scheme for further development.
4. Demonstrate an ability to advance an engineering design to the defined end state.

(2) Define Performance Indicators: For each of the competencies identified, define performance Indicators (PIs) that are explicit statements of expectations of the student learning. They can act as measuring tools in assessment to understand the extent of attainment of outcomes. They can also be designed to determine the appropriate achievement level or competency of each indicator so that instructors can target and students can achieve the acceptable level of proficiency.

Performance Indicators:

a). Apply formal idea generation tools to develop multiple engineering design solutions
b). Build models, prototypes, algorithms to develop a diverse set of design solutions.
c). Identify the functional and non-functional criteria for evaluation of alternate design solutions.

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3. Program Outcomes- Competencies- Performance Indicators:

A list of competencies and associated performance indicators for each **PO of the** Management Department is listed below.

PO I: Management knowledge: Apply the knowledge of basic management theories to classical and neo-classical theories for the solution of complex business problems.

Competency		Indicators	
1.1	Demonstrate appropriate skills attitude for solving business problems	1.1.1	Apply classical theories to solve business Problems.
		1.1.2	Apply neo-classical theories to solve business Problems.
1.2	Demonstrate competence in applying theories	1.2.1	Apply basic management theory to solve a business problem
1.3	Demonstrate competence in management	1.3.1	Apply concept such as interpersonal communication to solve business problems in the initial stage.
1.4	Demonstrate competence in different scopes of management to the program	1.4.1	Apply the concept of understanding and communicating economic, social, legal, ethical and global aspects of business

PO 2: Problem analysis: Identify, formulate, research literature, and analyze complex management problems reaching substantiated conclusions using principles and concepts of management.

Competency		Indicators	
2.1	Demonstrate an ability to identify and formulate complex business problem	2.1.1	Articulate problem statements and identify objectives
		2.1.2	Identify systems, variables, and parameters to solve the problems
2.2	Demonstrate an ability to formulate a solution plan and methodology for business problem	2.2.1	Reframe complex problems into interconnected sub-problems
		2.2.2	Identify, assemble and evaluate information and resources.
		2.2.3	Identify existing processes/solution methods for solving the problem, including forming justified approximations and assumptions
		2.2.4	Compare and contrast alternative solution processes to select the best process.
2.3	Demonstrate an ability to formulate and interpret a model	2.3.1	Combine scientific principles andmanagement
		2.3.2	Identify assumptions necessary to allow modeling of a system at the level of accuracy required.

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2.4	Demonstrate an ability to execute a solution process and analyze results	2.4.1	Apply management theories, models and computations to solve business models.
		2.4.2	Produce and validate results through skilful use of contemporary tools and models
		2.4.3	Identify sources of error in the solution process, and limitations of the solution.
		2.4.4	Extract desired understanding and conclusi consistent with objectives and limitations of the analysis

PO 3: Design/Development of Solutions: Design solutions for complex business problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

Competency		Indicators	
3.1	Demonstrate an ability to define a complex/ open-ended problem in business terms	3.1.1	Recognize that critical analysis is key to good problem definition
		3.1.2	Elicit and document, organisation requirements from stakeholders
		3.1.3	Synthesize organisation requirements from a review of the state-of-the-art
		3.1.4	Determine design objectives, functional requirements and arrive at specifications
3.2	Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1	Apply formal idea generation tools to develop multiple business solutions
		3.2.2	Build models/prototypes to develop a diverse set of design solutions
		3.2.3	Identify suitable criteria for the evaluation of alternate design solutions
3.3	Demonstrate an ability to select an optimal design scheme for further development	3.3.1	Apply formal decision-making tools to select optimal business solutions for further development
		3.3.2	Consult with domain experts and stakeholders to select business solution for further development
3.4	Demonstrate an ability to advance an business model to defined end state	3.4.1	Refine a conceptual design into a detailed design within the existing constraints (of the resources)
		3.4.2	Generate information through appropriate tests to improve or revise the design

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Improving Quality and Structure of Assessment

For improving the structure and quality of assessment in various management programs following points need to be remembered:

1. In Indian education system, written examinations play a major role in assessing the learning and awarding of grades to the student. Universities and colleges give highest weightage to the outcomes of the written examinations in overall grading. Questions raised in the examination/test papers play an important role in defining the level of learning the student is expected to achieve in the courses and hence in the program. Since assessment drives learning, the design of question papers needs to go beyond the mere test of memory recall. They also need to test higher-order abilities and skills.

2. Written examinations assess a very limited range of outcomes and cognitive levels. Particularly in the courses, where course outcomes (COs) cover a broad range of expectations, written examinations alone will not be sufficient to make valid judgments about student learning. A wide range of assessment methods (e.g., term papers, open-ended problem-solving assignments, course/lab project rubrics, portfolios etc.) need to be employed to ensure that assessment methods match with learning outcomes.

3. It is advisable to formulate assessment plans for each of the course in the program that brings clarity to the following:

   a. Alignment of assessment with learning outcome of the course
   b. Level of learning (cognitive) student is expected to achieve
   c. Assessment method to be adapted

1. Bloom's Taxonomy for Assessment Design:

Bloom's Taxonomy provides an important framework to not only design curriculum and teaching methodologies but also to design appropriate examination questions belonging to various cognitive levels. Bloom's Taxonomy of Educational Objectives developed in 1956 by Benjamin Bloom was widely accepted by educators for curriculum design and assessment. In 2001, Anderson and Krathwohl modified Bloom's taxonomy to make it relevant to the present-day requirements. It attempts to divide learning into three types of domains (cognitive, affective, and behavioral) and then defines the level of performance for each domain. Conscious efforts to map the curriculum and assessment to these levels can

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help the programs to aim for higher-level abilities which go beyond remembering or understanding, and require application, analysis, evaluation or creation.

Revised Bloom's taxonomy in the cognitive domain includes thinking, knowledge, and application of knowledge. It is a popular framework in engineering education to structure the assessment as it characterizes complexity and higher-order abilities. It identifies six levels of competencies within the cognitive domain which are appropriate for the purposes of engineering educators.

According to revised Bloom's taxonomy, the levels in the cognitive domain are as follows:

Level	Descriptor	Level of Attainment
1	Remembering	Recalling from the memory of the previously learned material
2	Understanding	Explaining ideas or concepts
3	Applying	Using the information in another familiar situation
4	Analyzing	Breaking information into the part to explore understandings and relationships
5	Evaluating	Justifying a decision or course of action
6	Creating	Generating new ideas, products or new ways of viewing things

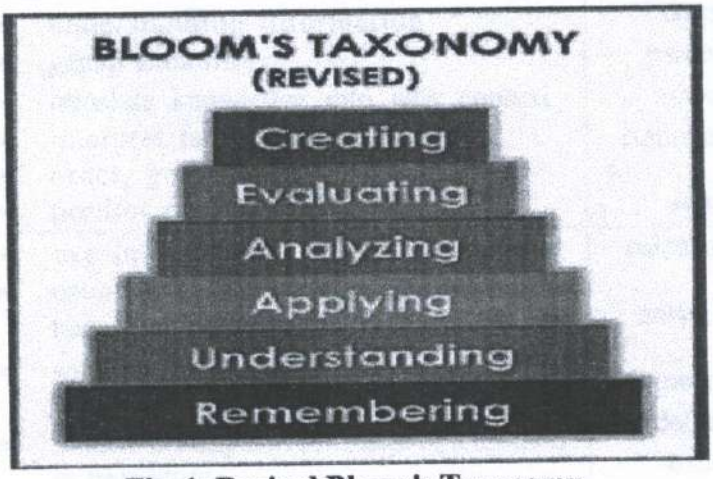

Fig. 1: Revised Bloom's Taxonomy

Bloom's taxonomy is hierarchical, meaning that learning at the higher level requires that skills at a lower level are attained.

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2 Action Verbs for Assessment:

Choice of action verbs in **constructing** assessment questions is important to consider. Quite often, the action verbs are indicators of the complexity (level) of the question. Over time, educators have come up with taxonomy of measurable verbs corresponding to each of the Bloom's cognitive levels. These verbs help us not only to describe and classify observable knowledge, skills and abilities but also to frame the examination or assignment questions that are appropriate to the level we are trying to assess.

Suggestive list of skills/ competencies to be demonstrated at each of the Bloom's level and corresponding cues/ verbs for the examination/test questions is given below:

Level	Skill Demonstrated	Question Cues/ Verbs for Tests
Remember	• Ability to recall of information like facts, conventions, definitions, jargon, technical terms, classifications, categories, and criteria. • Ability to recall methodology and procedures, abstractions, principles, and theories in the field. • Knowledge of dates, events, places mastery of subject matter.	List, define, tell, describe, recite, recall, identify, show, label, tabulate, quote, name, who, when, where
Understand	• understanding information • grasp meaning • translate knowledge into new context • interpret facts, compare, contrast • order, group, infer causes • predict consequences	describe, explain, paraphrase, restate, associate, contrast, summarize, differentiate interpret, discuss
Apply	• use information • use methods, concepts, laws, theories in new situations • solve problems using required skills or knowledge • Demonstrating correct usage of a method or procedure	calculate, predict,apply, solve, illustrate, use, demonstrate, determine, model, experiment, show, examine, modify
Analyze	• break down a complex problem into parts • Identify the relationships and interaction between the different parts of a complex problem • identify the missing information, sometimes the redundant information and the contradictory information, if any	classify, outline, break down, categorize, analyze, diagram, illustrate, infer, select

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Evaluate	• compare and discriminate between ideas • assess value of theories, presentations • make choices based on reasoned argument • verify value of evidence • recognize subjectivity • use of definite criteria for judgments	assess, decide, choose, rank, grade, test, measure, defend, recommend, convince, select, judge, support, conclude, argue, justify, compare, summarize, evaluate
Create	• Use old ideas to create new ones • Combine parts to make (new) whole, • generalize from given facts • relate knowledge from several areas • predict, draw conclusions	design, formulate, build, invent, create, compose, generate, derive, modify, develop, integrate

3 Assessment Planning

While using Bloom's taxonomy framework in planning and designing of assessment of student learning, following points need to be considered:

1. Normally the first three learning levels; remembering, understanding and applying and to some extent fourth level analyzing are assessed in the Continuous Assessment Evaluation (CAE) and Term End Examinations (TEE), where students are given a limited amount of time. And abilities; analysis, evaluation and creation can be assessed in extended course works or in a variety of student works like course projects, mini/ minor projects, internship experience and final year projects.
2. Before adopting this framework for reforms in examination system of a University/Institution, it is worthwhile to study the present pattern of assessment in each of the course in the program to gain insight about:
   a) Alignment of assessment questions with course learning outcomes
   b) Whether all the learning outcomes are tested; sometimes some learning outcomes are over tested at the expense of others which may be not tested at all.
   c) Overall weightage in the assessment, to each of Bloom's learning levels.
   d) Assessment methods used to adequately assess the content and desired learning outcomes.

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Based on the study, improvement priorities for each of the above factors need to be arrived at. The reform process needs to be well planned and implemented through institutional strategy and communicated to all stakeholders particularly to the students.

3. A good and reasonable examination paper must consist of various difficulty levels to accommodate the different capabilities of students. Bloom's taxonomy framework helps the faculty to set examination papers that are well balanced, testing the different cognitive skills without a tilt towards a tough or easy paper perception. If the present examination questions are more focused towards lower cognitive skills, conscious efforts need to be made to bring in application skills or higher cognitive skills in the assessment. It is recommended that at institution/ University level, upper limit need to be arrived for lower order skills (for example, no more than 40% weightage for knowledge-oriented questions). It is important to note that as nature of every course is different the weightage for different cognitive levels in the question papers can also vary from course to course.

Assessing higher order skills and professional skills

In the 21st century, professional skills (also known as soft skills, generic skills or transferable skills) have emerged as important attributes of a Management Graduate. Studies show that Industry/ employers around the world value these abilities more than the disciplinary knowledge. This is also reflected in the NBA graduate attributes wherein six out of twelve attributes belong to this category, viz. (1) communication, (2) teamwork, (3) understanding ethics and professionalism, (4) understanding global and societal contexts, (5) lifelong learning, and (6) knowledge of contemporary issues. Further, higher-order cognitive abilities like critical thinking, problem-solving and making informed decisions are also crucial for a graduate to succeed in the emerging world. Though the employers consider these professional skills and higher abilities as important, students are weak in them. The main challenge surrounding them is that they are difficult to assess through existing conventional examination system.

Innovative Educational Experiences to teach and assess

One of the main obstacles in addressing these outcomes is the limitation of educational experience we create within our engineering programs. Most of the coursework in our programs are oriented towards teaching technical knowledge and skills; hence, the assessment is limited to those abilities. However, acquiring the professional outcomes may not result simply from participation in a

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Particular class or set of classes. Rather, these outcomes are more often acquired or influenced through sources both in and outside the classroom

To address these challenges, comprehensive reforms are needed in the way we design our curriculum, student learning experiences and assessment of the outcomes. Worldwide several attempts are being made to address these challenges. Following are the few educational experiences that are recommended to teach and assess professional outcomes and higher-order cognitive abilities:

- Course projects
- Open-ended experiments in laboratories
- Project-based learning modules
- MOOCs
- Co-Curricular experiences
- Mini / Minor projects
- Final year projects
- Internship experiences
- E-portfolios of student works

Using Scoring and Rubrics as Assessment tools

To evaluate the above, student works for attainment of course outcomes and hence POs, it is of utmost importance to have reliable methods / proper assessment tools. Rubrics provide a powerful tool for assessment and grading of student work. They can also serve as a transparent and inspiring guide to learning. Rubrics are scoring, or grading tool used to measure a students' performance and learning across a set of criteria and objectives. Rubrics communicate to students (and to other markers) your expectations in the assessment, and what you consider important.

There are three components within rubrics namely (i) criteria / performance Indicator: the aspects of performance that will be assessed, (ii) descriptors: characteristics that are associated with each dimension, and (iii) scale/level of performance: a rating scale that defines students' level of mastery within each criterion.

Open Book Examination

It was noted that the traditional written examinations have a significant weakness that they tend to encourage rote learning and more superficial application of knowledge. This deficiency can be overcome by "open-book examination". Open-book examination is similar to time constrained written examinations but designed in a way that allows students to refer to either class notes, textbooks, or other approved material while answering questions. They are particularly useful if you want to test skills in application, analysis and evaluation, i.e. higher levels of Bloom's taxonomy. However, in a program, the courses or the curriculum areas that are best suited to an open-book exam are to be carefully chosen.

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Advantages of open-book examinations

I. Less demanding on memory and hence less stressful

2. Questions can emphasize more on problem-solving, application of knowledge and higher-order thinking rather than simple recall of facts.

3. Assessment questions can reflect real-life situations that require comprehension, information retrieval and synthesizing skills of the students to solve.

Designing a good openbook examination

- Set questions that require students to do things with the information available to them, rather than to merely locate the correct information and then summarize or rewrite it.
- The questions in open-book exam must take advantage of the format, and give more weightage to the application of knowledge, critical thinking and use of resources for solving real complex engineering problems.
- As the nature of questions is complex, it is to be ensured that the students get enough time. Open book test questions typically take longer time compared to traditional examinations. It is advisable either to set less number of questions that encompass 2 or 3 concepts taught or allocate longer duration of time for the examinations.

Conclusion

The examination reform policy is very important tool to develop a student to face ever changing challenges in this competitive world. **We, at GIMS, Andharua, Bhubaneswar, Odisha always strive for quality education. To achieve our objective, we always try to bring out reforms in the examination system which is in synchronous with the examination reform policy of AICTE.**

References

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