An Analysis of Question Papers for Evaluating English Language Communication Skills of Engineering Students

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ABSTRACT

On their way to set standards of international norms, AICTE observed that most of the courses in engineering are not meeting the course outcome. AICTE has now come out with an Examination Reform Policy 2018 with the intention of improving the quality of technical education. One of the areas that are recognized as needing improvement to produce quality engineering education is assessment.All the institutions have been instructed to improve their testing methods. One of the major initiatives towards this is to set question papers following Bloom's taxonomy.

This study is an attempt to investigate whether question papers set for evaluating English language communication skills map with Bloom's taxonomy or not, if they map, whether all the cognitive levels are covered or not. It also tries to find out the challenges English language teachers face during making question papers. This research has done a content analysis of 117 English language communication questions from 2015 to 2022. ELCS lab is prescribed for B.Tech first-year students in their first and second semesters. The researcher has analyzed each question according to the six cognitive levels given in Bloom's taxonomy. The result shows that the largest percentage of questions stand on the first three levels which are low-order cognitive levels. Although Bloom's taxonomy prescribes that in a balanced question paper L1 and L2 should be given 30% to 40% weightage, L3 and L4 should be given 40% to 50% weightage, whereas the last two levels L5 and L6 should be given 10% to 20% weightage. The analysis showed that the question paper did not have any question or home assignment which can cover evaluating and creating cognitive levels.

Keywords: Bloom's Taxonomy, English Language Communication Skills, Cognitive level, higher-order cognitive skills, lower-order cognitive skills, Outcome-based education,

The purpose of education is to build a person who can think of his/her own, the person who can transfer his/her knowledge to the work he/she is doing. With this perspective, All India Council for Technical Education (hereafter AICTE) adopted Outcome-Based Education (OBE) after signing the Washington Accord. It is a performance-based approach. It has been widely used as a reform model in global engineering education. The National Board of Accreditation, an accreditation agency of India is a signatory member of the Washington Accord. Washington Accord is an agreement among nations to set a uniform standard in education so that students' spectrum of availing of international courses will be broader. This agreement assures employers and educators spread across the nations have received their engineering education in an institution which practice international quality norm to produce industry-ready

employees. Now following the OBE pattern in curriculum designing, teaching method and evaluation is mandatory for all the engineering institutions according to the National Board of Accreditation. So far, the OBE framework was mapping curriculum with programme outcome but now the focus is also on mapping evaluation or testing tools with course outcome and programme outcome. Examination papers are one of the testing tools apart from day-to-day assessment, seminars, projects, and classroom activities. To make it effective, AICTE Examination Reform Policy 2018 directed the technical institutions and universities in the country to adopt this policy.

India's National Assessment and Accreditation Board proposed a complete report to the Ministry of education and engineering institutions that made it mandatory after June 2014. According to this, any engineering student is eligible for a 476 visa if he or she has completed engineering from a recognized tier 1 institution that is accredited by NBA after 13th June 2014. OBE emphasizes learning outcomes in terms of knowledge, skills, attitude, and value rather than grades or marks. It also impresses upon maintaining the global standards in teaching and assessment. The objective of Outcome-based education is to build competency in students to face competition in a global education platform. There are three parameters on which the progress of a graduate is assessed, they are - Program Educational Objectives (PEO), Program Outcomes (PO), and Course Outcomes (CO). Programme outcome indicates students' capability and ability to perform a certain task in the specialized field with the domain or the programming knowledge. Course outcomes signify specific knowledge or skill they develop

after the course. Later, the real outcome is mapped with the expected outcome to see the gap if any. The tools for measurement are two Mid examinations and a semester-end examination in a semester, project, day-to-day assessment, assignment, lab work etc.

(University Grant Commission. (pg no.25, 2018))

To enable engineering students to stand according to the global norms, it is required to focus on upgrading cognitive skills to higher-level skills. Failure to perform on higher-level skills and a high percentage of focus on questions which test only memory pulled AICTE's attention to introduce a model for testing through question papers with the purpose of helping students to achieve the learning outcome through lower to higher-level skills. Off-lately it was felt that Indian engineering students require the ability to apply knowledge, solve problems, to analyze and create. To measure cognitive skills, several countries use Bloom's taxonomy. Assessment process must confirm that they are not testing only one level of cognitive ability of the learners rather they should be designed to test all the levels.

1. Examination protocol followed by all the technical education institutions in B. Tech English Language Communication Skills Lab

1. 1 Lecture + 01 Lab 2 Hours per week

2. Evaluation Process: There would be three layers of evaluation out of 100 Marks:

3. (i) Continuous Assessment- 30% Marks

4. (ii) End Course Practical Test -40% Marks

5. (iii) End Course Written Test-30% Marks

Table 1- Weightage of Bloom's Taxonomy in Examination Scheme

Bloom's (Taxonomy) Levels	Percentage of weightage	Marks allotted
L1 (Knowledge: Remember)	30 to 40	21 to 28
L2 (Comprehension: Understand)		
L3 (Application: Apply)	40 to 50	28 to 35
L4 (Analysis: Analyze)		
L5 (Synthesis: Create)	10 to 20	7 to 14
L6 (Evaluation: Evaluate)		
Total	100	70

1.2. Bloom's taxonomy

"Bloom's taxonomy provided the measurement tool for thinking."

(Forehand, 2005 pg. no. 5)

Bloom classifies each cognitive level in hierarchical order. He labels knowledge, comprehension, and application as low- order levels of thinking while analysis, synthesis and evaluation are higher-order thinking levels. As it became popular, there were many interpretations of each level of thinking order. With due course of time, it was felt by Anderson and Krathwohl (2001) wanted to save it from being outdated. Technology brought a paradigm shift in all the sphere learners' cognitive ability to methods and tools of teaching. Therefore, Bloom's taxonomy changed at three levels: terminology, structure and emphasis (Forehand 2005).

	Original	Revised
Terminology	Knowledge	Remembering
	Comprehension	Understanding
	Synthesis	Evaluating
	Evaluating	Creating

Structure : from one dimension it changed to two dimensions: the knowledge dimension and the cognitive dimension. The knowledge dimension encompassed factual, conceptual, procedural and meta-cognitive knowledge. To indicate factual knowledge, action verbs such as list, summarize, classify, order, rank, and combine can be used. Describe, interpret, experiment, explain, assess, plan are used for conceptual knowledge. Procedural knowledge is suggested by the action verbs tabulate, predicate, calculate, differentiate, conclude, compose. Meta-cognitive levels are characterized by appropriateness, execution, construction, achievement, action, and actualization.

Emphasis: earlier it was a model used in assessment but later it emphasized on curriculum designing, teaching methodology and in evaluation. (Forehand, 2005).

1.0 Knowledge
   1.10 Knowledge of specifics
      1.11 Knowledge of terminology
      1.12 Knowledge of specific facts
   1.20 Knowledge of ways and means of dealing with specifics
      1.21 Knowledge of conventions
      1.22 Knowledge of trends and sequences
      1.23 Knowledge of classifications and categories
      1.24 Knowledge of criteria
      1.25 Knowledge of methodology
   1.30 Knowledge of universals and abstractions in a field
      1.31 Knowledge of principles and generalizations
      1.32 Knowledge of theories and structures

2.0 Comprehension
   2.1 Translation
   2.2 Interpretation
   2.3 Extrapolation

3.0 Application

4.0 Analysis
   4.1 Analysis of elements
   4.2 Analysis of relationships
   4.3 Analysis of organizational principles

5.0 Synthesis
   5.1 Production of a unique communication
   5.2 Production of a plan, or proposed set of operations
   5.3 Derivation of a set of abstract relations

6.0 Evaluation
   6.1 Evaluation in terms of internal evidence
   6.2 Judgments in terms of external criteria

1.0 Remember – Retrieving relevant knowledge from long-term memory.
   1.1 Recognizing
   1.2 Recalling

2.0 Understand – Determining the meaning of instructional messages, including oral, written, and graphic communication.
   2.1 Interpreting
   2.2 Exemplifying
   2.3 Classifying
   2.4 Summarizing
   2.5 Inferring
   2.6 Comparing
   2.7 Explaining

3.0 Apply – Carrying out or using a procedure in a given situation.
   3.1 Executing
   3.2 Implementing

4.0 Analyze – Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.
   4.1 Differentiating
   4.2 Organizing
   4.3 Attributing

5.0 Evaluate – Making judgments based on criteria and standards.
   5.1 Checking
   5.2 Critiquing

6.0 Create – Putting elements together to form a novel, coherent whole or make an original product.
   6.1 Generating
   6.2 Planning
   6.3 Producing

Fig. 1: Krathwohl, (2002).

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	Analysing	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

Level	Skill Demonstrated	Question cues / Verbs for tests
1. 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
2. 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
3. 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
4. Analyse	• 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
5. Evaluate	• compare and discriminate between ideas • assess value of theories, presentations	assess, decide, choose, rank, grade, test, measure, defend, recommend, convince,

BLOOM'S TAXONOMY (REVISED)

Creating
Evaluating
Analyzing
Applying
Understanding
Remembering

Fig. 2: Bloom's Taxonomy

(AICTE , 2018)

1.3. Literature review

Pikhart, M., & Klimova, B. (2019) used BL (Bloom's taxonomy) in her blended classroom to check students' satisfaction. They discovered that the students also found the new course in a much more effective positive way than the previous one. She measured students 'satisfaction before BL in a blended classroom and after implementing BL. They conducted two tests- the first test studies the students' satisfaction with the class before introducing Bloom's taxonomy, and the second study tests the students' satisfaction with the new approach using Bloom's taxonomy. They could experience their classes more productively and effectively implementing BL.

Assaly, I. R., & Smadi, O. M. (2015) unlike other researchers shifted focus from testing to textbook. They analyzed follow up questions given after every reading text. Bloom's taxonomy was used to evaluate the levels of the questions. They revealed that the majority of the questions were mapping with cognitive level of understanding. The percentage of lower cognitive level understanding was 52%. Although cognitive level remembering and applying had significantly low percentage i.e., 3.7% and 6% respectively. The noticeable point was the significantly high percentage of cognitive level evaluation and analysis. Questions from these two levels were 40% in the textbooks.

Kumar et.al. (2013) in their study compared question papers set by Indian and American faculty members. They made comparative analysis question papers as per Bloom's taxonomy. Result of the comparison showed that question papers set by Indian faculty members had a high percentage of first three levels of lower order thinking skills: remembering, understanding, and applying while question papers set by USA faculty members had higher order thinking skills.

Methodology

Quantitative content analysis was selected for this study because Bloom's revised taxonomy has provided a list of action verbs which are indicators of cognitive levels. To find out those action verbs in question paper and to study their right mapping with the levels, it is important to use content analysis framework as Content analysis is a research tool used to identify the presence of certain words, themes, or concepts within some given text.

In the data collection process, 117 questions from English Language Communication Skills question papers from 2015 to 2022 were collected through random sampling from various branches and sections of engineering. Quantitative method was employed to organize data statistically. Content analysis framework was constructed with the verbs given by Bloom's in his taxonomy to indicate cognitive levels. These verbs indicate outcome expected. Data used in this research has been taken from only the first year ELCS lab question paper as lab activities include LSRW skills. The second reason for selecting only the ELCS lab is the availability of multiple papers as lab internal and external papers are prepared by each teacher separately. The English language communication lab is for B.Tech first year students. Students attend ELCS lab in both the semesters of their first year. Students also have English as a theory subject, but the question paper of theory paper is common to all the students. The common paper does not reveal the teacher's individual awareness of implementation, integration, understanding Bloom's taxonomy. It would also not have revealed the challenges faced by teachers while setting question papers for formative and summative assessments. This research hypothesizes that lack of awareness and

understanding of Bloom's taxonomy among teachers results in poor quality of question papers in higher education.

The objective of the study is:

1. To check whether Bloom's taxonomy is mapped with questions rightly or not

2. To examine whether questions are mapping with learning outcome

3. To check whether Bloom's taxonomy is followed for preparing English language teaching or not.

4. To know what challenges are faced by English language teachers while mapping question papers on Bloom's taxonomy.

AICTE is conducting workshops on exam reform on war footing to bring quality in standard of question papers. To measure the success or failure of these examination reform workshops, a robust corpus is required. This study can contribute to the corpus created for examination reform. It can also be a reference for the English language teachers for setting question papers.

Analysis and Interpretation of the Result

The result must answer two basic research questions- whether questions map with BL or not and whether expected outcome could be achieved from questions or not. So, we need to see course outcomes meet with expectations BL or not. English language communication skills have the following syllabus in the first semester:

Phonetics- transcription, vowel and consonant sounds, word stress, intonation, report writing and presentation skills.

Expected course outcomes are:

CO 1: **Emerge as good speakers and listeners.**

CO 2: **Develop critical and analytical thinking.**

CO 3: **Write effectively.**

CO 4: **Develop effective presentation skills using multimedia tools.**

CO 5: **Neutralize mother tongue influence on their English and make them proficient speakers.**

The syllabus attempts to make students independent, clear, and confident thinkers and speakers. It also addresses the requirement of an effective presenter and writer. BL also emphasizes on developing these skills in level 3 and 4 which stand for applying and analysis. Therefore, the syllabus and outcome are aligned with BL.

The second semester syllabus and course outcomes are:

CO 1: **Evolve as effective communicators and will develop narrative skills**

**CO 2:** **Emerge as decision makers and autonomous learners**

CO 3: **Develop critical and analytical skills**

CO 4: **Gather ideas and information and organize them coherently.**

CO 5: **Develop leadership and team building skills.**

Just a minute, group discussion, debate, public speaking, describing objects, person and situation, information transfer, telephone etiquettes.

All the topics and keywords of expected outcome address BL as they stress upon developing
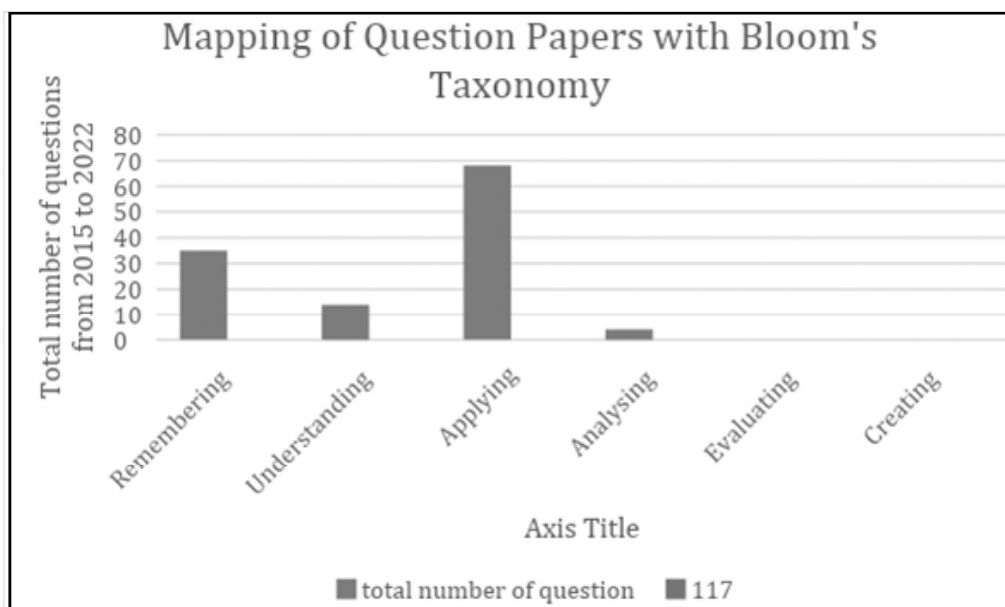
Fig. 3: Analysis of mapping

Table 2: Total number of levels in question papers

Total number of questions	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
117	35	14	68	4	0	0

Question papers of internal and external examinations of both the semesters analyzed showed 68 questions of applying level, 35 of remembering level and 14 of understanding level questions in the question papers. It shows a high percentage of remembering, understanding, and applying which are lower order thinking levels. Although Krathwohl (2005) considers applying an intermediate cognitive level. We can see in the graph that 4 questions are covering the cognitive level of analyzing. No question was found in formative and summative question papers from higher order cognitive level of evaluating and creating.

Syllabus of English language communication skills lab has been designed to build professionals who can stand in global competitive environment, still we find that question papers are not assessing acquisition of the skills and knowledge which is required to verify their higher order cognitive levels. Limited teaching hours, large and heterogeneous classrooms, teaching methodology and students' attitude towards English language might discourage teachers to make challenging question papers.

Table 2: The verbs used in question papers

Action verbs	Frequency of action verbs	Bloom's taxonomy level
Give	13	L 2
draw	4	-
Transcribe	9	-
Write	50	L3, L6
Mention	5	-
Illustrate	2	L2,L3,L4
Describe	9	L1
Define	4	L1
Identify	1	L1, L2
Divide	5	L4
Mark	7	-
Select	2	L4
Develop	5	L3
Change	1	L3
Explain	2	L2,L3,L4
Fill	2	-
List out	1	-
Study	1	-

The table 2 above shows the action verbs used in question papers. The most frequent action verbs are- explain, illustrate, identify, write, select, develop, change, divide, and give. We can notice that these action verbs belong to the first three lower cognitive levels of BL.

Although question papers set for assessing English language communication skills which include listening, speaking, reading and writing do not incorporate listening and reading in the written examination. Apart from written examination, 20% weightage is allocated for day-to-day assessment, tests, assignments, and activities but the researcher has observed that they also do not cover higher-order thinking. The summative assessment also has a large percentage of questions aligned to LOT skills.

The reason for this percentage is structured and the restrictive testing method does not allow teachers to test students on higher-order questions as they need to test a large number of students in a limited time duration.

In education when the three T's- text, teaching and testing are focused equally only the quality of outcome improves. Bloom's taxonomy is used only for testing ignoring the other two T's. Giesen (2014) states the applicability of Bloom's taxonomy to assessment techniques, textbooks, and curriculum design.

Textbooks or the activities prescribed are dealt with teaching methods used for low-order cognitive skills. Although with little attention the same content can be taught with the method which would inculcate higher-order skills. The following examples illustrate how the same topic can be tested on different cognitive levels:

Another reason for the nil percentage of Higher order thinking skills is that English language labs do not have any topic which allows teachers to involve students in projects or any long-term assignment. The assignment given to them requires only lower order thinking skills to complete.

Table 3: Model for incorporating all the levels of Bloom's taxonomy

Listening skills						
Group discussion	**Remembering L1**	**Understanding L2**	**Applying L3**	**Analyzing L4**	**Evaluating L5**	**Creating L6**
	Students listen to live GD and then ask questions to test their ability to remember the content	Students are asked to listen and decide who supports the topic and who opposes.	Students are asked to evaluate participants' skills on GD parameters	Students need to analyze whether arguments presented were valid or not	Students need to evaluate whether GD was good or bad based on the arguments made.	Students need to give their opinion on the given topic.

Writing skills						
Group discussion	**Remembering L1**	**Understanding L2**	**Applying L3**	**Analyzing L4**	**Evaluating L5**	**Creating L6**
	Describe the process of conducting group discussio	Read the group discussion script and observe the participants who are for the topic and who are against the topic.	Evaluating the participants on group discussion evaluation parameters.	Read the group discussion script and write your own conclusion on this group discussion.	What mistakes participants have made in this group discussion? Who is the leader in this GD?	Create your own GD script on the following topic.

Challenges faced by teachers:

- Teachers are not able to interpret each cognitive level of Bloom's taxonomy. Action verbs indicating the level appear in more than one category of the cognitive levels.

- All four skills are difficult to measure in a single question paper covering all the cognitive levels.

- Marks allocation is set uniformly by the examination department so teachers cannot assign more marks to HOTS questions.

- Creating rubrics for the summative assessment of LSRW on BL is challenging.

Conclusion

AICTE's initiative to improve the quality of testing is a praise-worthy effort but the present research has revealed that the gap between syllabus to testing needs to be filled to get the desired outcome. The result of this study is like earlier studies which also showed a high frequency of LOTS in English language communication skills classrooms. English communication is dealt with like other engineering subjects in terms of evaluation and marks distribution despite the fact the nature and purpose of these two subjects are entirely different. English communication labs focus on soft skills, unlike technical subject labs. The first level of BL is knowledge which has different implications in core subjects and in the language classrooms, but question papers and action verbs refer to the meaning given in Bloom's taxonomy. Bloom's taxonomy refers to knowledge as knowledge of terminology, criteria, and classification which is justified in core subjects but in language knowledge of terminology does not make the student a good communicator. Many students learn definitions of reports or phonemes but they are not able to

use language effectively to communicate well.

Bloom's taxonomy can be implemented effectively if clear guidelines for technical and non-technical subjects are given by the board of studies. Workshops on BL workshops discuss taxonomy in detail but hands-on experience on the application will give clarity to teachers.

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