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Creating awareness and implementing Blooms Taxonomy in teaching pedagogy—with special reference to Higher Education

Shivani Agarwal
KIET School of Management,
KIET Group of Institutions, Delhi-NCR,
Ghaziabad, UP, India
E-mail: jindal.shivani24@gmail.com

Vijender Kumar Solanki
Department of Computer Science and Engineering, CMR Institute of Technology
Hyderabad, India, IEEE Senior Member
E-mail: vijendersolanki@ieee.org

***Abstract*—The main objective of this study is to design a questionnaire which helps to measure the constructive alignment of Blooms taxonomy as per the six level of cognition. To achieve the objective, questionnaire was designed. This questionnaire will be helpful in ascertaining the present level of respondent as per the blooms taxonomy so that corrective actions could be taken to optimize learning outcomes. In Indian higher education, especially in Tier 2 and Tier 3 colleges are more heavily biased towards lower order thinking skills. With this questionnaire, current standing of the respondent can be measured and progression to higher order thinking skills can be facilitated at the end of the trainer/educator, hence bridging the gap between academia and industry.**

***Index Terms*—Blooms taxonomy, Higher Education, Learning, Constructive Alignment.**

I. Introduction

The future of any individual, society and country is solely depends on the level of education. The level of education does not mean to have higher and higher degrees but in current scenario, the actual meaning of education is to "know how to apply the existing knowledge to solve and create an innovative solution".

As learning progresses it becomes more complex. A mere understanding of any concept becomes increasingly insufficient with the progression in learning complexity. Several models have been proposed to measure the level of cognition of the learner. One such widely accepted and acclaimed model is Blooms Taxonomy.

Although named after Bloom, the taxonomy is based on series of conferences from 1949-53 which were designed to improve existing curricula. It has three domains namely: Cognitive, Affective and Psycho motor which is shown in figure 1.

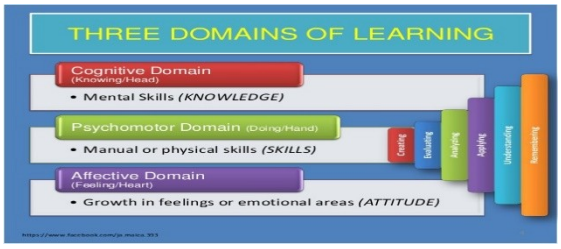

Figure 1: Three Domains of Learning

II. Need of Study

The present Proposal is based on the most widely used domain, i.e. the cognitive domain. The main reason behind the choice is, at the level of higher education, a student predominately uses this domain. There is no doubt that Bloom's Taxonomy of Educational Objectives for the cognitive domain [3] has had a considerable impact on educational thought and practice all over the world [5]. The original taxonomy is a six-level classification system that uses observed student behavior to infer the level of cognitive achievement. These are: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation were shown in Figure 2.

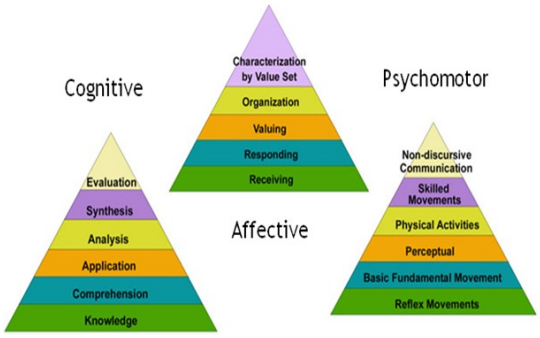

Figure 2: Six Levels of Cognitive Domains

A. Research Motive

These six levels can be categorized into two thinking orders according to the cognitive thinking required at each level. These two thinking orders are Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS) which is represented in Figure 3.

Figure 3: Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS)

The affective domain is generally shaped during the formative years of the life of the student and family and early schooling has a major impact on expression of this domain.

Psycho motor domain caters to hand-eye coordination and hands on training. Higher education is more inclined towards classroom learning and control experiments rather than giving hands on experiences. So, as far as the scope of the present proposal goes, we are limiting ourselves to only **cognitive domain**.

B. *Research Gaps*

Research study [6] mentioned that huge gap has existed in education system. Moreover, the level of understanding, knowing and creating new solutions in the minds of students is also missing [7] which can be fulfilled with the help of blooms taxanomy.

III. Methods

A. *Sample*

The current study works on measuring the level of awareness of implementing blooms taxonomy in teaching pedagogy in higher education. Data were collected through a questionnaire designed by the investigators and pilot testing was done to validate the questionnaire designed after extensive literature review. The items of questionnaire were generated based on guiding theoretical principles that each level of bloom taxonomy. The study was conducted on a sample of 190 educators (21 Professors, 39 Associate Professors, 130 Assistant Professors responded) working in different academic organizations in NCR region, India. Convenient purposive sampling procedures were used to collect data from educators/trainers. The questionnaire also sought personal information such as name, age, gender, educational qualification, occupation, marital status, designation, and work experience. Descriptive statistics of the demographic variables (gender and marital status, educational qualification, and work experience) were shown in Table 1.

Demographic n = 190		**No. of respondents**	**Percentage (%)**
Age (in years)	Young (27-37)	120	63.15
	Middle age (38-47)	50	26.31
	Old Age(48-57)	20	10.52
Gender	Male	90	47.36
	Female	100	52.64
Education	Post-Graduation	107	56.31
	PhD	83	43.69
Designation	Assistant Professor	130	68.42
	Associate Professor	39	20.53
	Professor	21	11.05

B. *Objectives and Relevance of the Study*

The main objective of this study is to design a questionnaire which helps to measure the constructive alignment of Blooms taxonomy as per the six level of cognition. To achieve the objective, questionnaire was designed. This questionnaire will be helpful in ascertaining the present level of respondent as per the blooms taxonomy so that corrective actions could be taken to optimize learning outcomes. In Indian higher education, especially in Tier 2 and Tier 3 colleges are more heavily biased towards lower order thinking skills. With this questionnaire, current standing of the respondent can be measured and progression to higher order thinking skills can be facilitated at the end of the trainer/educator, hence bridging the gap between academia and industry.

IV. Discussion

The findings of the data were represented in the form of bar graph and pie charts for easily understanding to the large number of audiences. To check the awareness of blooms taxonomy in higher education, question was asked that "Are you aware of educational learning objective models called Bloom's Taxonomy?". The **first finding** of the result was shown in figure 4. A majority of 73.8% (140) respondents confirm that they are aware of educational learning objective models called Bloom's Taxonomy and the remaining 26.2% (50) respondents do not know (not aware) about educational learning objective models called Bloom's Taxonomy.

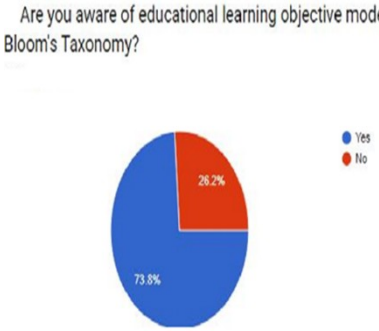

Figure 4: Awareness about Bloom's Taxonomy

Second finding represented in figure 5. Out of 140 respondents, 52.8% have applied it in their classroom teaching methodology and the remaining 47.2% have not yet applied in their classroom teaching methodology

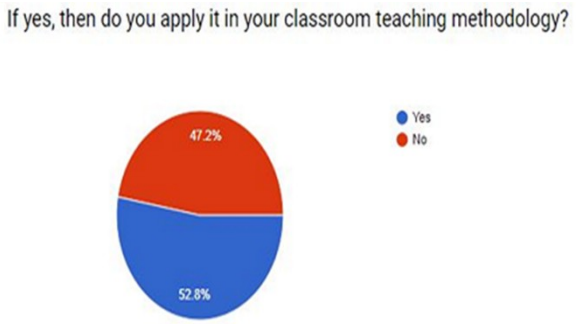

Figure 5: Classroom teaching methodology

Figure 6: Applied taxonomy model in their lassroom teaching if appropriate training would be given

Third finding represented in figure 6. Out of 190 respondents, 68.6 % respondents can incorporate the taxonomy model in their classroom teaching if appropriate training would be given. 30.2% respondents mentioned that they may incorporate the taxonomy model in their classroom teaching if appropriate training would be given. For a surprise of the researchers, 1.2% (2) respondents were not able to incorporate the taxonomy model in their classroom teaching if appropriate training would be given.

Fourth finding represented in figure 7. Out of 190 respondents, 73.7 % respondents can incorporate any innovative teaching methodology in the classroom. 26.3% respondents cannot incorporate any innovative teaching methodology in the classroom.

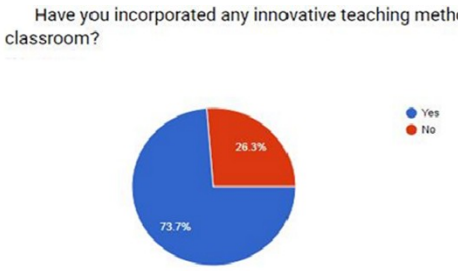

Figure 7. Able to incorporate any innovative teaching methodology in the classroom

Fifth finding represented in figure 8. Out of 190 respondents, 52.6% (102) respondents using most of the techniques in the classroom viz, giving notes to students, using charts/models/diagrams to teach concepts or theories, video lectures, animations. 35.6% (69) respondents using all the techniques in the classroom viz, giving notes to students, using charts/models/diagrams to teach concepts or theories, video lectures, animations. 11.3% (22) respondents using some of the techniques in some time in the classroom viz, giving notes to students, using charts/models/diagrams to teach concepts or theories, video lectures, animations. 0.5% (1) respondents using all or some of these techniques very rarely in the classroom viz, giving notes to students, using charts/models/diagrams to teach concepts or theories, video lectures, animations.

Sixth finding represented in figure 9. Out of 190 respondents, 51% (99) respondents using most of the techniques in the classroom viz, Quiz, conceptual assignments, asking students questions based on the concept taught in the previous class, reinforcement by reiteration in the next class. 41.2% (80) respondents using all the techniques in the classroom viz, Quiz, conceptual assignments, asking students questions

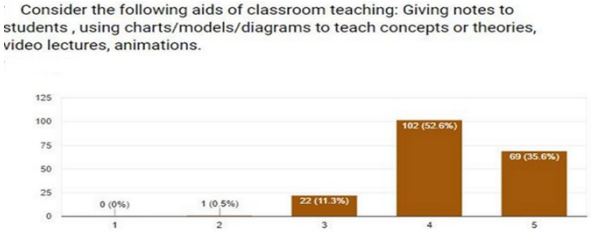

Figure 8: Cognition Level 1- Remembering

based on the concept taught in the previous class, reinforcement by reiteration in the next class. 7.2% (14) respondents using some of the techniques in some time in the classroom viz, Quiz, conceptual assignments, asking students questions based on the concept taught in the previous class, reinforcement by reiteration in the next class. 0.5% (1) respondents using all or some of these techniques very rarely in the classroom viz, Quiz, conceptual assignments, asking students questions based on the concept taught in the previous class, reinforcement by reiteration in the next class.

Seventh finding represented in figure 10. Out of 190 respondents, 55.2% (107) respondents using most of the techniques in the classroom viz, Presentations by students, simulation exercises, creation of working models by students, giving problems of varying difficulty level to students for solving, explaining practical applications of theoretical concepts. 11.9% (23) respondents using all the techniques in the classroom viz, Presentations by students, simulation exercises, creation of working models by students, giving problems of varying difficulty level to students for solving, explaining practical applications of theoretical concepts. 28.9% (56) respondents using some of the techniques in some time in the classroom viz, Presentations by students, simulation exercises, creation of working models by students, giving problems of varying difficulty level to students for solving, explaining practical applications of theoretical concepts. 4.1% (8) respondents using all or some of these techniques very rarely in the classroom viz, Presentations by students, simulation exercises, creation of working models by students, giving problems of varying difficulty level to students for solving, explaining practical applications of theoretical concepts.

Eighth finding represented in figure 11. Out of 190 respondents, 45.9% (89) respondents using most of the techniques in the classroom viz, Comparative analysis, debugging, giving proofs and evidences to prove a theory/concept, discussions, role plays. 24.2% (47) respondents using all the

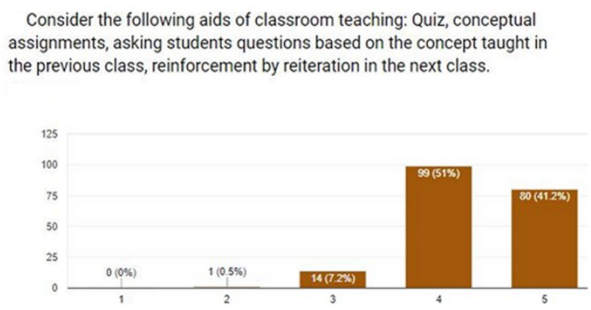

Figure 9: Cognition Level 2- Understanding

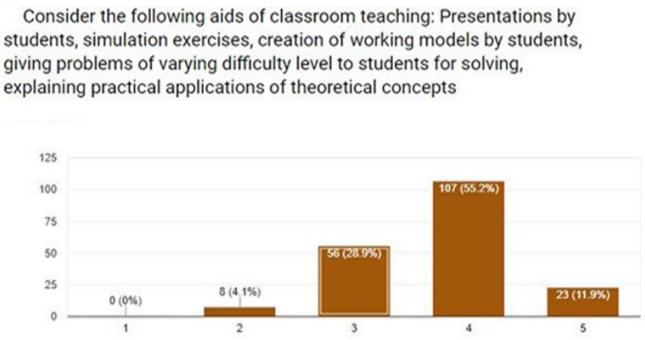

Figure 10: Cognition Level 3- Applying

techniques in the classroom viz, Comparative analysis, debugging, giving proofs and evidences to prove a theory/concept, discussions, role plays. 24.7% (48) respondents using some of the techniques in some time in the classroom viz, Comparative analysis, debugging, giving proofs and evidences to prove a theory/concept, discussions, role plays. 4.6% (9) respondents using all or some of these techniques very rarely in the classroom viz, Comparative analysis, debugging, giving proofs and evidences to prove a theory/concept, discussions, role plays. 0.5% (1) respondents do not use any of the above techniques in the classroom viz, Comparative analysis, debugging, giving proofs and evidences to prove a theory/concept, discussions, role plays.

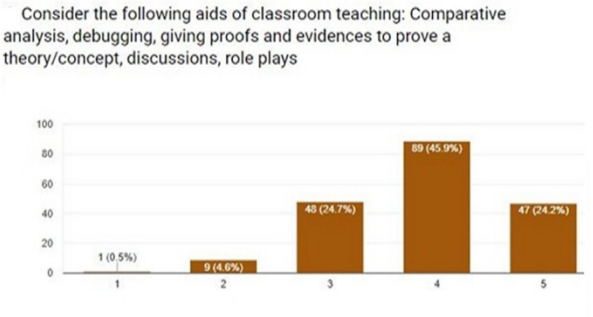

Figure 11: Cognition Level 4- Analyzing

Ninth finding represented in figure 12. Out of 190 respondents, 39.2% (76) respondents using most of the techniques in the classroom viz, Encouraging students to ask challenging questions which are related not only to subject but also to larger context of human values and professional ethics, encouraging students to think out of the box for problem solving, encouraging student to go beyond syllabus and study new developments in the subject. 41.2% (80) respondents using all the techniques in the classroom viz, Encouraging students to ask challenging questions which are related not only to subject but also to larger context of human values and professional ethics, encouraging students to think out of the box for problem solving, encouraging student to go beyond syllabus and study new developments in the subject. 18% (35) respondents using some of the techniques in some time in the classroom viz, Encouraging students to ask challenging questions which are related not only to subject but also to larger context of human values and professional ethics, encouraging students to think out of the box for problem solving, encouraging student to go beyond syllabus and study new developments in the subject. 1% (2) respondents

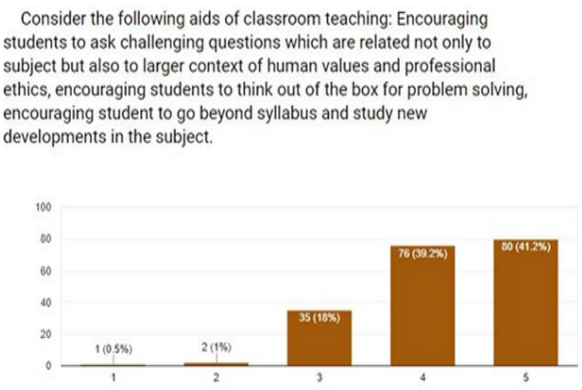

Figure 12: Cognition Level 5- Evaluating

using all or some of these techniques very rarely in the classroom viz, Encouraging students to ask challenging questions which are related not only to subject but also to larger context of human values and professional ethics, encouraging students to think out of the box for problem solving, encouraging student to go beyond syllabus and study new developments in the subject. 0.5% (1) respondents don't use any of the above techniques in the classroom viz, Encouraging students to ask challenging questions which are related not only to subject but also to larger context of human values and professional ethics, encouraging students to think out of the box for problem solving, encouraging student to go beyond syllabus and study new developments in the subject.

Ninth finding represented in figure 13. Out of 190 respondents, 43% (83) respondents using most of the techniques in the classroom viz, give assignment/projects to students which promote learning by doing, encourage students to take up unique/novel projects. 39.2% (76) respondents using all the techniques in the classroom viz, give assignment/projects to students which promote learning by doing, encourage students to take up unique/novel projects. 18% (35) respondents using some of the techniques in some time in the classroom viz, give assignment/projects to students which promote learning by doing, encourage students to take up unique/novel projects. 1% (2) respondents using all or some of these techniques very rarely in the classroom viz, give assignment/projects to students which promote learning by doing, encourage students to take up unique/novel projects. 0.5% (1) respondents don't use any of the above techniques in the classroom viz, give assignment/

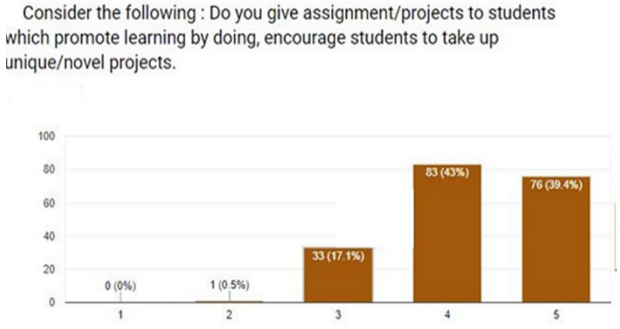

Figure 13: Cognition Level 6- Creating

projects to students which promote learning by doing, encourage students to take up unique/novel projects.

V. Conclusion

The present study reports that majority of faculty members made extensive use of LOTS techniques. An average of 77.6% faculty members used at least one of the HOTS techniques in their classroom. 73.8% faculty members mentioned that they are aware of Bloom's Taxonomy. Surprisingly, only 52.8% admitted to making its use in classroom teaching, **indicating a state of being unconsciously unaware**. These ~42% faculty members do not know that they do not know the concept of Bloom's Taxonomy. The **unconsciously unaware** state can be rectified with proper training and workshops. So, the academicians are suggested to incorporate the blooms taxonomy model in their classroom teachings for the better results and learning among students.

VI. Recommendation and Implications

To make sure that students in management and education can apply what they learn, teachers are recommended to implement the following:

• Provide opportunities for the student to use ideas, theories, or problem-solving techniques and apply them to new situations.

• Review the student's work to ensure that he/she is using problem-solving techniques independently.

• Provide questions that require the student to define and solve problems.

• Ensure that assignments given cater to HOTS

• Question papers should be an optimum mix of LOTS and HOTS.

• An ongoing project/assignment/group task that gradually increases in complexity can be implemented

• This mix should gradually move towards achieving higher ratio of HOTS questions during the semester

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