In the name of Allah, The Most Beneficent The Most Merciful.

الجامعة الإسلامية العالمية شيتاغونغ
International Islamic University Chittagong

Notes on
Creative Questions

1. **Introduction**: In 1956, **Benjamin Bloom** headed a group of educational psychologists who developed a classification of levels of intellectual behavior important in learning by doing **creative questions**. During the 1990's a new group of cognitive psychologist, lead by **Lorin Anderson** (a former student of Bloom's), updated the taxonomy reflecting relevance to 21st century work. This system defines different capabilities in a hierarchical fashion that may be developed in trainees as a result of learning experiences. These capabilities are not restricted to any specific subject areas. These are described in terms of the **components OBE**, where the trainee will be able to do to prove that the trainee has achieved the various levels of learning outcomes. The scheme identifies and classifies the products of learning experiences.

Human capital is renewable through continuous learning and this ability must be an integral part of a sustained economy and for development intelligent capital. Bloom's Taxonomy promote higher forms of thinking in education, such as **analyzing and evaluating concepts, processes, procedures, and principles**, rather than just remembering facts (rote learning). This Taxonomy provides a clear and robust tool for guiding the development of **teaching and learning.** The uses of Bloom's Taxonomy in Teaching-Learning are as follows:

1. Setting **Learning Outcomes** (LOs) **& educational objectives**
2. Selecting **teaching methods/strategies**
3. Selecting **teaching aids-materials**
4. Preparation of **assessment tools**
5. Development & review of **curriculum**
6. **Development & review of Syllabus**

In outcome-based education assessment is a key part to determine whether or not a qualification has been achieved by the students. **An authentic assessment is** the Assessment that fits meaningful, real-life learning experiences. It includes recording evidence of the learning process, applications in products and performances, perception of visual and audio relationships, integrations of new knowledge, reflecting profitably on one's own progress, and interpreting meaning in consideration of contextual facts. The program must have assessment and evaluation processes to determine the extent to which the SOs and POs are achieved.

However, Bloom's Assessment involves into three category of learning domains as given below:

i. **The Cognitive Domain** – knowledge-based domain, consisting of six levels, encompassing intellectual or thinking skills (**Knowledge**), Bloom,1956a.
ii. **The Psychomotor Domain** – skills-based domain, consisting of five levels, encompassing physical skills or the performance of actions. **(Attitude)**
iii. **The Affective Domain** – attitudinal-based domain, consisting of five levels, encompassing attitudes and values **(Skills),** Krathwohl, Bloom, Masia, 1973.

2. **Major Domains of** Bloom's **Taxonomy:** The relation among the three major domains **Knowledge, Attitude** & **Skill** is shown in Figure 1:

i. Knowledge is power**, ii. Attitude** is a little thing, but it makes a big difference, **iii. Skills** speaks louder than words. **3-components of education** are interlinked with one another: one can supplement the other but cannot complement.

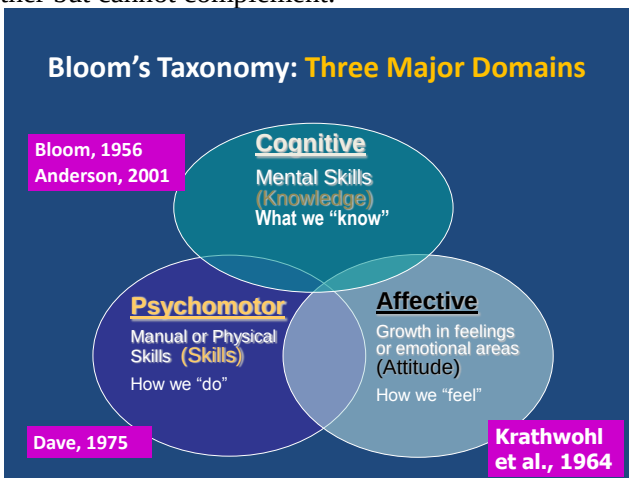


Figure **1:** Key Words (related to **Cognitive** (Knowledge**), Affective** (Attitude) and **Psychomotor (**Skill) are shown in Table 1,

Table 1 Definition of Bloom's sub-Domains.

SL #	**Cognitive** (Knowledge**)**	**Affective (Attitude)**	**Psychomotor (Skills)**
6	**Creating** (Evaluation); Ability to put ideas together in new ways to produce new or original work.	**Characterization** (Internalizing values): Has a value system that controls their behavior. Total behavior is consistent with internalized values	**Naturalizatio**n: Having high level performance become natural, without needing to think much About it.
5	**Evaluating** (Synthesis): Ability to justify a stand or decision	**Organization**: Committed to a set of values as displayed by behavior	**Articulation**: Coordinating a series of actions, achieving harmony and internal consistency.
4	**Analyzing** (Analysis): Ability to breakdown an idea into its component parts to draw or discover probable connection among different ideas	**Valuing:** The worth or value a person attaches to a particular object, phenomenon, or beha**vior.**	**Precision:** Refining, becoming more exact.
3	**Applying** (Application): Ability to apply knowledge and ideas in a new situations or to address problems to find out a working solution	**Responding to phenomena**: Complies to given expectation; shows interest	**Manipulation**: Being able to perform certain actions by following instructions and practicing.
2	**Understanding:**(Comprehension) Ability to explain ideas or concepts in own words or translating/ interpreting into alternative ways	**Receiving phenomena**: Awareness, willingness to hear, selected attention.	**Imitation**: Observing and patterning behavior after someone else
1	**Remembering** (Knowledge): Ability to recall facts and basic concepts, retrieve information what has been learnt before		

The wordings of the Bloom's Taxonomy with useful terminologies are shown in Table-**2 and Figure-2**.
Table 2: Bloom's Taxonomy in its various forms represents the process of learning. (Rashid, M.H,2012) .

Level of learning		Bloom's Taxonomy in its various forms represents the following process of learning (**Figure.2**)	**Order of Learning**
Step 1.	Support	First, we must **remember** a concept.	**Lower** Order of Learning
Step 2:		Before we can **understand** the concept, we must **remember** it.	
Step 3:	Explore	Before we can **apply** the concept, we must **understand** it.	
Step 4:		Before we **analyze** it we must be able **to apply** it.	**Higher** Order of Learning
Step 5:	Design	Before we can **evaluate** its impact, we must have **analyzed it.**	
Step 6:		Before we can **create** we must **have remembered, understood, applied, analyzed, and evaluated**.	

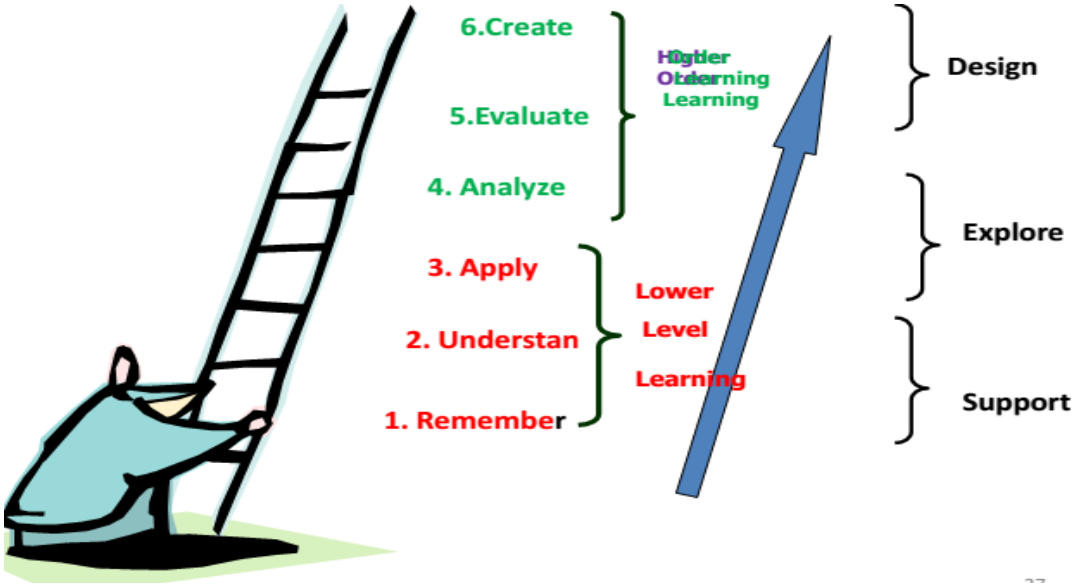


Figure 2. Bloom's cognitive domain, Six sub-domains of cognitive domain

Tables **3, 4 and 5** shows details of meaning, examples, and list of **Key Words** (Action Verbs) for the Bloom's taxonomy domains of **Cognitive. Affective and Psychomotor** respectively.

2a. <u>Cognitive Domain (Knowledge):</u> Bloom's Taxonomy cognitive domain new version by Anderson et al.-2000. It is knowledge on mind based. This includes the recall of knowledge and cultivation of intellectual skills. The taxonomy becomes a framework of analysis for educational outcomes [Bloom,(1956), Bloom,(1956a)]. To date, most of the work in education has been in the cognitive domain (Table 3). Cognitive learning is demonstrated by knowledge recall and the intellectual skills: comprehending information, organizing ideas, analyzing and synthesizing data, applying knowledge, choosing among alternatives in problem-solving and evaluating ideas or actions.

Table 3: Cognitive Domain

Category	Definition	Key Words
Remembering	Can the student recall or remember the information?	Arrange, define, describe, duplicate, identify, label, list, match, memorize, name, order, outline, recognize, relate, recall, repeat, reproduce, select, state
Understanding	Can the student explain ideas or concepts?	Classify, convert, defend, describe, discuss, distinguish, estimate, explain, express, extend, generalize, give examples, identify, indicate, infer, locate, paraphrase, predict, recognize, rewrite, report, restate, review, select, summarize, translate
Applying	Can the student use the information in a new way?	Apply, change, choose, compute, demonstrate, discover, dramatize, employ, illustrate, interpret, manipulate, modify, operate, practice, predict, prepare, produce, relate, schedule, show, sketch, solve, use, write
Analyzing	Can the student distinguish between the different parts?	Analyze, appraise, break down, calculate, categorize, compare, contrast, criticize, diagram, differentiate, discriminate, distinguish, examine, experiment, identify, illustrate, infer, model, outline, point out, question, relate, select, separate, subdivide, test
Evaluating	Can the student justify a stand or decision?	Arrange, assemble, categorize, collect, combine, comply, compose, construct, create, design, develop, devise, design, explain, formulate, generate, integrate, manage, modify, organize, plan, prepare, propose, rearrange, reconstruct, relate, reorganize, revise, rewrite, set up, summarize, synthesize, tell, write
Creating	Can the student create new product or point of view?	Appraise, argue, assess, attach, choose, compare, conclude, contrast, defend, describe, discriminate, estimate, evaluate, explain, judge, justify, interpret, relate, predict, rate, select, summarize, support, value

2b. <u>Affective domain (Attitude)</u>): Bloom's Taxonomy Affective domain new version by Anderson et al.- 2000. It describes interests, attitudes, and values. This also includes one's emotions such as feelings, values, appreciation, enthusiasms, motivations, and attitudes [Krathwohl et al. 1973]. The **five** major categories are listed in Table 4 with details of meaning, examples, and list of action verbs. The affective domain is applicable to develop non-engineering skills, e.g. communication and social skills. Affective learning is demonstrated by behaviors indicating attitudes of awareness, interest, attention, concern, and responsibility, ability to listen and respond in interactions with others, and ability to demonstrate those attitudinal characteristics or values which are appropriate to the test situation and the field of study.

Table 4 : Affective domain

Category	Definition	Key Words
Receiving	Awareness, willingness to hear, selected attention.	Observe, be conscious, realize, be sensitive, attend, listen, discriminate , gives, holds, identifies, locates, names, points to, selects, sits erect, replies, uses
Responding	Learning outcomes may emphasize compliance in responding, willingness to respond or satisfaction in responding (motivation).	Willing, comply, obey, look, engage, practices respond, prefer. accept, devote, is loyal to, consider, exhibit, participate, enrich, explore, conforms answers, assists, complies, conforms, discusses, greets, helps, labels, performs, presents, reads, recites, reports, selects, tells, writes
Valuing	The worth or value a person attaches to a particular object, phenomena, or behavior.	**Examples**: Is sensitive towards individual and cultural differences (value diversity), shows ability to solve problems. **Key Words**: Assume responsibility, initiate, examine, differentiate, justify, enable , completes, describes, differentiates, explains, follows, forms, initiates, invites, joins, proposes, reads, reports, selects, shares, studies, works
Organization	Organizes values into priorities by contrasting different values, resolving conflicts between them, and creating an unique value system.	**Examples**: Accepts responsibility for one's behavior. Accepts professional ethical standards. **Key Words**: Weigh, defend, explain, formulate, generalize, integrate , adheres, alters, arranges, combines, compares, completes, defends, explains, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes
Characterization	The behavior is pervasive, consistent, predictable, and most importantly, characteristic of the learner.	Examples: Shows self-reliance when working independently. Cooperates in group activities. Key Words: examine, judge, revise, solve, verify, discriminate, influence, listen, propose, acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, verifies.

2c. <u>Psychomotor Domain (Skills)</u>: Bloom's Taxonomy **Psychomotor Domain new version by Anderson et al. - 2000.** It involves manipulative skills including physical skills, key boarding, using technical instruments and other skills. This domain is characterized by **five** progressive levels of behaviors from observation to mastery of a physical skill. This is shown in Table 5. The psychomotor domain is related to the development and testing of laboratory or physical skills.

Table 5: Psychomotor Domain

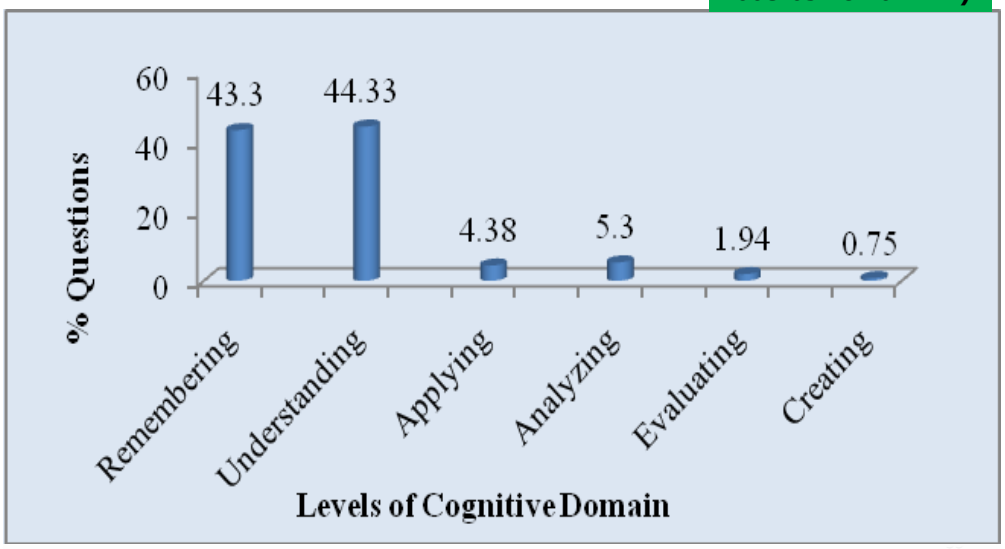
Category	Definition	Key Words
Imitation	Observing and patterning behavior after someone else.	Copying
Manipulation	Being able to perform certain actions by following instructions and practicing.	This is the beginning of doing the task or learning the idea on one's own. This is done through repetition as someone else.
Precision	Refining, becoming more exact.	This is where the trainer gets out of the way because the trainee has learned the task or idea so that it can be done without mistakes or hesitation. This is the "getting out of the way" stage.
Articulation	Coordinating a series of actions, achieving harmony and internal consistency.	This is done through the trainee being so versed in the movements of the learned task or idea that they can now manipulate the task or idea in ways that makes it work with more than one action.
Naturalization	Having high level of performance become natural, without needing to think much about it.	Taking the actions from the conscious to the subconscious. This is when the action becomes to natural to the trainee that no thought is put into the work....it's just done without thought.

Table- 6: Objectives of Study

Ask	**Why you Study?**
Answer (KSA)	**1. Knowledge**: To acquire Knowledge;
	2. Skill: To improve skills
	3. Attitude: To develop positive attitude and morality

3. Making Creative Questions: Questions requiring creativity of the learners to answer, may be termed as creative. These are usually higher level questions as per Bloom's taxonomy of learning (Table-2), which need a great deal of creative thinking on the part of learners to answer. The teaching resource must also be well-conversant with the Bloom's taxonomy of learning to set the creative questions in the examination. Despite the fact about 92% of total questions in the higher education of Bangladesh are **lower level questions (Figure 3)**, this is not at all helpful to raise the quality of higher education in our country. This scenario may be attributed to the lack of awareness about creative questions among our faculty members. To overcome such situation, it is necessary to set creative questions for different courses of study by using Bloom's taxonomy as mention in the tables 2, **3, 4 and 5**.

Figure 3. Average status of undergraduate questions in respect of cognitive domain of Bloom's Taxonomy in a Public Univ (Sessions: 2008-09 To 2011-12)



Average status of undergraduate questions in respect to cognitive domain of Bloom's Taxonomy in a Public University is shown in figure 3. It's a paradox in our educational system that a student can make **all 'A's** and still **not understand** a principle, concept, or idea. Under the scenario, in the 36th Academic Council meeting held on 15th April, 2017, which has duly approved in the 200th Syndicate meeting held on 17th April 2017, IIUC agreed to set higher order learning questions in each course at least 60% in OBE system as describe in table 2 and figure 2. There may be more than 60% questions to be set in higher order mode following the process of Bloom's Taxonomy. It is not necessary that we follow these steps of learning process for each and every task or concept. Students should however be tested for the major concepts and theories at different Bloom's level in a complete course. An example for Calculation of Learning Order & Level of a Course is described in **Table 7.**

Academic Quality Work (AQW)-is a culture, where Quality of teaching, learning and assessments of educational processes and outcomes shall be improved step-by-step by keeping faculty involved, where the current shortfalls or problems shall be identified and corrected. The central theme of AQW is **"If we can't measure it, we can't improve it".** Diagnostic assessments will find ways to get feedback on student learning.

Table 7 : *** Curse wise calculation of % Learning Order &Level of question as per Blooms taxonomy**:

Course Code..... Course Title .....Semester..... Year.....

Prepared by: ..... Date: .....

Question Number	1. Lower Order learning			2. Higher Order Learning			
	Remember	Understand	Apply	Analyze	Evaluate	Create	Total Marks
1							10
2							10
3							10
4							10
5							10
6							10
7							10
Total Marks	**X**	**Y**	**Z**	x	y	z	70
% of marks in each Order of Learning	% = [(**X+Y+Z**)/ 70]x100 =			% =([x+y+z)/ 70] x100=			100%
% of marks in each Level	**Level 1&2(support)= [(X+Y**)/70]x100=		**Level 3&4(Explore)=** [(**Z+x**)/70] x100=		**Level 5&6(Design)=** [(y+z)/70]x100=		

*Calculation shall be completed by each course teacher & submitted to the Chairman of the Exam. Committee.

Table 8 : ****Program wise calculation of Learning Order &Level as per Blooms taxonomy**

Name of the Program: B.Sc XYZ (Autumn-2019 Semester)						
Semester	**Number of courses offered with (CH)**	**Average % of** lower order learning	**Average % of** higher order learning	**Average % of** Question in **Support** level	**Average % of** Question in **Explore** level	**Average % of** Question in **Design** level
1st	**6(18) say.**					
2nd						
3rd						
4th						
5th						
6th						
7th						
8th						
Average of all semesters						

**Calculation shall be completed by the respective Chairman of the Exam. Committee & copy to be submitted to the Chairman of the department as well as to the Director IQAC.

Table 9 Able to answer

Both teachers and students are now able to : 1. Differentiate the three domains (Cognitive, Affective and Psychomotor) 2. State the levels of each domain 3. Describe the differences between the levels 4. Explain the use of Bloom's Taxonomy in teaching-learning 5. Mention the use of Bloom's Taxonomy in Curriculum Development 6 State three domains of Learning 7 Tell 6 levels of Cognitive domain	Few Questions? 1. Name & differentiate the three domains of Bloom's Taxonomy 2. What levels are there altogether in Bloom's Taxonomy? 3. Mention two action verbs for each of the cognitive level 4. What are the uses of Bloom's Taxonomy in teaching-learning? 5. How will you use Bloom's Taxonomy in your Lesson Plan? 6 Why will you study Bloom's Taxonomy? 8 How does cognitive domain differ from psychomotor domain? 9 Who was Dr. Benjamin Bloom ?

কাজের ছেলে ,যোগিন্দ্রনাথ সরকার	
দাদখানি চাল, মুসুরির ডাল, চিনি-পাতা দৈ, দু'টা পাকা বেল, সরিষার তেল, ডিমভরা কৈ। পথে হেঁটে চলি, মনে মনে বলি, পাছে হয় ভুল; ভুল যদি হয়, মা তবে নিশ্চয়, ছিঁড়ে দেবে চুল। দাদখানি চাল, মুসুরির ডাল, চিনি-পাতা দৈ, দু'টা পাকা বেল, সরিষার তেল, ডিমভরা কৈ। বাহবা বাহবা – ভোলা ভুতো হাবা, খেলিছে তো বেশ! দেখিব খেলাতে, কে হারে কে জেতে, কেনা হলে শেষ।	দাদখানি চাল, মুসুরির ডাল, চিনি-পাতা দৈ, ডিম-ভরা বেল, দু'টা পাকা তেল, সরিষার কৈ। ওই তো ওখানে, ঘুরি ধরে টানে, ঘোষদের ননী; আমি যদি পাই, তা হলে উড়াই, আকাশে এখনি! দাদখানি তেল, ডিম-ভরা বেল, দুটা পাকা দৈ, সরিষার চাল, চিনি-পাতা ডাল, মুসুরির কৈ! এসেছি দোকানে-কিনি এই খানে, যত কিছু পাই; মা যাহা বলেছে, ঠিক মনে আছে, তাতে ভুল নাই! দাদখানি বেল, মুসুরির তেল, সরিষার কৈ, চিনি-পাতা চাল, দুটা পাকা ডাল, ডিম ভরা দৈ।

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