

KEY WORDS:

Curriculum, Bloom's Taxonomies, Outcome-Based Education, Learning Outcome, Architectural Education

Developing a Conceptual Framework for Curriculum Design in Architectural Education in India

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ABSTRACT

Indian education system is changing its focus from 'teaching' to 'learning'. Keeping the pace with current happenings in the field of architecture, it is imperative to shift from traditional education systems to 'Outcome Based Education' (OBE), which includes Program Outcomes (PO), Programme Specific outcome and Course Outcomes (CO). Curriculum includes syllabus, which is a hidden contract between the learners and teachers. It sends a message to the learner regarding significant learning of the programme. Outcome based curriculum design has been adopted in education systems around the world. This paper presents a conceptual framework for designing outcome-based curriculum for Architectural Education using Bloom's Taxonomy within the guidelines set by governing bodies and drawing on examples from India. Particularly it demonstrates how Bloom's perspective can be used to analyse curriculum and courses set by council of Architecture (COA). Focusing on learners and the process of learning, it suggests the key components of curriculum design that incorporates learning outcomes.



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Introduction

A curriculum is vital in any teaching-learning process and is not an exception in architectural education. Keeping pace with current happenings in the field of architecture, it is imperative to shift from the traditional education system to Outcome-Based Education (OBE), which includes Program Outcomes (PO), Programme Specific Outcomes and Course Outcomes (CO). The curriculum includes a syllabus, which is a contract between the learners and teachers. Focus on 'learning' and 'learners' is achieved through the curriculum development that is learner-centric. OBE focuses on effective curriculum design that induces knowledge, skills, abilities, values, and attitudes in learners.

Learning Outcomes are the statements that help in understanding and measuring the progress of the learners as a result of completing the program, course, unit, or particular lesson (Cruzon, 2004) and enable teachers to anticipate what learners should know (Huba & Freed, 2000). Anderson et.al (2001) categorises 'outcome' at three levels based on the purpose or function. First, it is 'global level' outcome that is linked to the vision. The second is 'educational level' outcome offering curriculum design which includes programme outcomes and course outcomes and the last 'instruction-level' outcome to prepare a lesson plan. Learning outcome also helps in describing intended results and intended changes (Anderson et.al, 2001).

There are various taxonomies of learning proposed by Bloom and others in education (Cruzon, 2004; Fink.2003) that help in understanding the link between course objectives and outcomes. The application of Bloom's Taxonomy in teaching practices has been widely researched. Many architectural institutes are using the same in the teaching and learning process. However, its application in curriculum or course design of architectural education is rare. Even the new COA guidelines of India (2020) do not clearly specify the framework for OBE. With universities in India adopting OBE as per UGC's guidelines, it is necessary to know how Bloom's Taxonomy can be used to develop course design for architectural education.

So, this paper provides a conceptual framework to design an architectural curriculum in India using Bloom's Taxonomy. The methodology included in depth review of literature, analysis of curriculum guidelines (2017 and 2020) suggested for architectural education by the Council of Architecture, India, and applying Bloom's Taxonomy to derive a framework for outcome-based learning. The remainder of the paper is arranged in 5 sections. First, it discusses the methodology. It is followed by Bloom's Taxonomy as a theoretical framework used for the study in the second section. The third section discusses guidelines for architectural education in India. The fourth section presents a conceptual framework and exemplified with cases of few courses. The last section draws the conclusions.

Research Methodology

Guidelines of UGC and COA are reviewed first in this research. Bloom's Taxonomy has been used as a theoretical framework and various dimensions of all three domains of

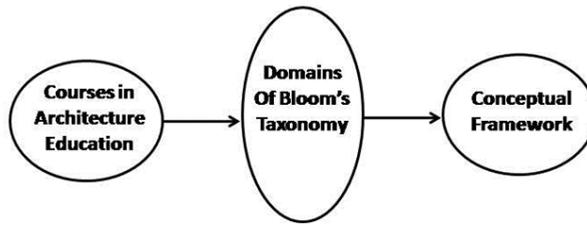


Figure1: Research Method
Source: Author

Bloom's Taxonomy considered. The courses suggested by the COA have been analysed through the lenses of Bloom's Taxonomy. Which courses should be under which domain are not specified in the guidelines set by COA, which this paper attempts to do. A conceptual framework for architectural education is suggested by incorporating the COA guidelines.

Curriculum makers conceptualized that Architecture Education is inevitable to knowledge, professional values as well as ethics and skill. These are relating to the three domains of Bloom i.e. Cognitive, Affective and Psychomotor.

Theoretical Framework

Bloom's Taxonomy embraces the likely outcome in the teaching-learning process, which helps the learners learn and teachers teach (Cruzon, 2004). It is a hierarchical ordering of learning outcomes in three domains namely Cognitive, Affective, and Psychomotor. The 'cognitive domain' is concerned with information, knowledge, theories, understanding; the 'affective domain' relates to attitude, feeling, perspectives and values; whereas the 'psychomotor domain' involves muscular skills, motor skills, practical abilities, and manipulation (Cruzon, 2004, Ellington et.al.1984). The three domains cognitive, affective, and psychomotor and their development levels in light of work by Bloom et.al. 1956; Hoque, 2017; and Dave, 1975 are shown in **Figure 2**.

'Cognitive domain' deals with intellectual learning that is thinking (related to head or brain) whereas learning positive attitude comes under the 'affective domain' which relates to the heart. The third domain, 'psychomotor' addresses practical skills relating to bodily movements, especially hand. Thus, 'Bloom's Taxonomy' provides a theoretical framework to understand the intended behaviour of a learner how he or she thinks, feels, and acts. It is the coordination of 3'H'-Head, Heart, and Hand (Weigel & Bonica 2014). According to Swami Vivekananda, the great social reformer of India, "*The essence of education is concentration of mind, not collecting the facts* (Walia, 2008)." Similarly, Albert Einstein believed, "*Education is not learning of facts but training of mind to think.*" This suggests that coordination of head, heart and hand is an essential secret of concentration and hence effective education.

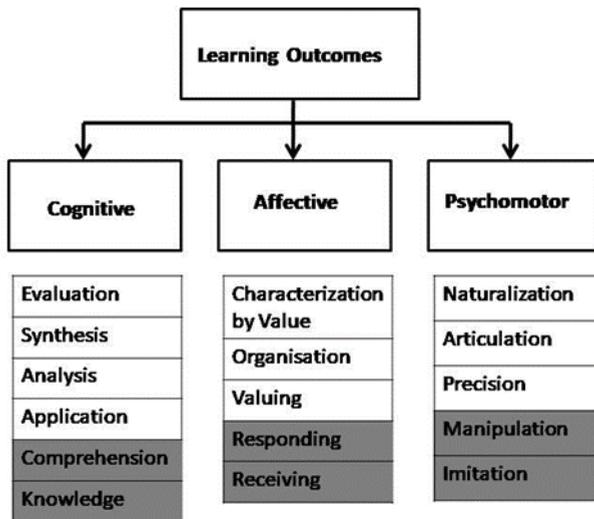


Figure 2: Blooms Taxonomy: Domains and Levels
Based on Bloom et.al, 1956; Hoque,2017; Dave, 1975

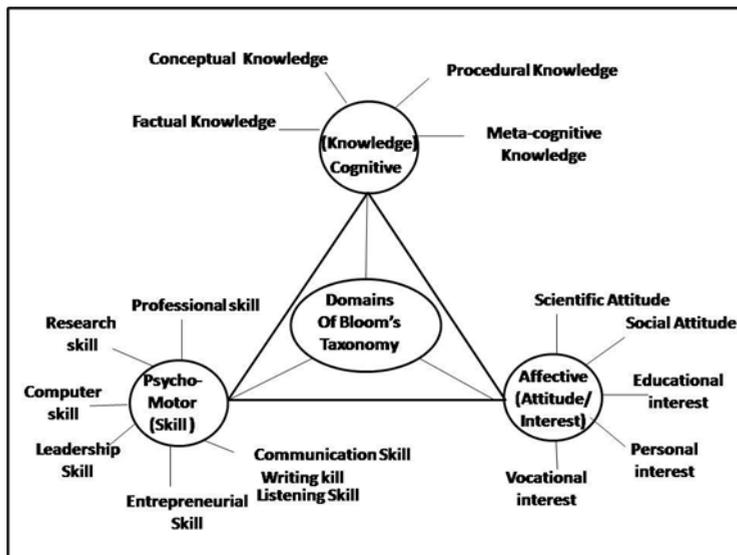


Figure 3: Dimensions of Blooms three Domains
Source: Author (Based on Anderson et.al.2001; Gronlund, 1970)

1. Cognitive Domain

The cognitive domain is addressing the various types of knowledge. The revised framework of taxonomy is two-dimensional containing 'cognitive process' and 'knowledge' (Anderson et.al 2001). The cognitive process contains six categories as, Remembering, Understand, Apply, Analyse, Evaluate and Create whereas the knowledge dimensions contain four categories: Factual, Conceptual, Procedural, and Meta-cognitive. The statement of objectives contains a verb and noun, wherein, verb generally describes the intended cognitive process and noun generally expresses the knowledge learners are expected to acquire and construct (Anderson et.al 2001). It was recommended by Tyler (1949) that the statements of objectives need to be expressed such that it clearly states the behaviour to be developed in course contents as well as the learners.

Development of Knowledge can be used in the place of course content as subject matter. Factual knowledge involves the knowledge of terminology, specific details and elements. It is addressing the basic elements students must know to be acquainted with a discipline. Conceptual knowledge contains knowledge in regards to classifications, categories, principles, theories, models, structure etc.; tackling the interrelationship amongst the basic elements. Procedural knowledge includes knowledge of subject-specific skills, subject-specific techniques and methods, criteria for determining when to use appropriate procedures. Meta-cognitive knowledge is knowledge of cognition general as well as awareness and knowledge of one's own cognition such as strategic knowledge, self-knowledge etc.

Another study links mechanically ventilated patient rooms to the presence of microbes which are distinct by their taxonomical identity than the ones found in the outdoor air. This was due to the low phylogenetical diversity of the bacteria found indoors and their closest relatives are the human pathogenic bacteria. The fact that there has been a reduction in the contact with the outdoor environment to make the building more sterile may actually do its opposite. This isolation of the indoor environment is argued as being probably not the best solution for creating bacteria safe spaces. This has led to a rekindling of our interest in the natural disinfection characteristics of outdoor air which were ignored in the past (Kembel, et al., 2012).

2. Affective Domain

This domain is attitudinal in concept. Attitude is the choice of personal actions that learner is expected to exhibit (Cruzon, 2004). The affective domain comprises all objectives relating to the development of feeling, attitude, and value (Ellington et.al, 1984). Gronlund (1970) provides a hierarchy of learning outcomes wherein attitude has classified as social and scientific; interests as personal, educational and vocational. Cruzon (2004) states that value concept incorporates the capacity to see as sound entire issues including ideas, attitudes and beliefs. Valuing involves acknowledgement of the intrinsic worth of a situation so that motivation is heightened, and beliefs emerged.

3. Psychomotor Domain

This domain is tending to the skills or abilities. As per Evans, skills are understood as “any ability generally assumed to have been learned, to perform a complex task, involving psychomotor coordination with ease, speed and accuracy (Cruzon 2004).” Skill is an organised and coordinated pattern of mental and /or physical activity (Cruzon 2004). According to Ellington et.al (1984),involving all objectives relating to hand-eye coordination, motor skills, practical abilities, manual dexterity. The author has put forth interpersonal objectives including communication skill (written, oral, listening skill), ability work as a member of a team, leadership skills, entrepreneurial skills etc covering the life skills (Ellington et.al (1984).

Guidelines for Architectural Education in India

1. Outline by University Grants Commission (UGC)

In India, University Grants Commission, the apex body of universities puts special thrust on Outcome-Based education and ensures that educational plan (curriculum), teaching and learning activities and assessment are continuously upgraded through an evaluation procedure. This framework is implemented through key components: Vision and Mission; Educational Objectives of the program; Programme Outcomes; and Course Outcomes. Nakkeeran et. al (2008) presents this framework as shown in **Figure 4**.

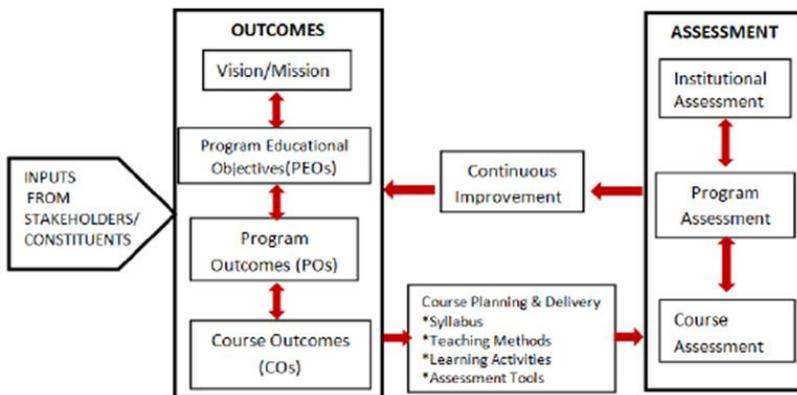


Figure 4: Framework of Outcome-Based Education
Adapted from Nakkeeran et.al, 2008

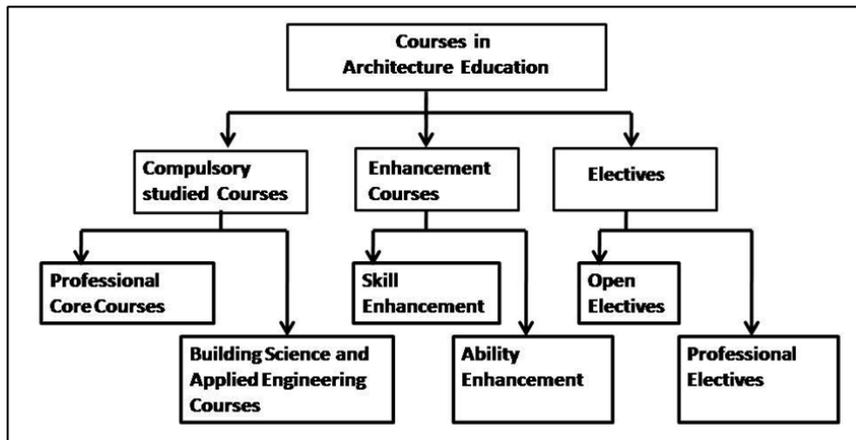


Figure 5: Framework of courses by COA
 Source: Author, Adapted from (2020 Notifications and 2017 guidelines)

Professional Core Courses	Building Science and Applied engineering Courses	Skill Enhancement Courses	Ability Enhancement Courses	Professional Electives
Basic Design & Visual Arts	Building Materials	Communication Skills	Professional Practice	Theory of Design
Architectural Design	Building Construction	Computer Studio	Practical Training	Vernacular Architecture
Architectural Design Thesis	Applied Mechanics	Building Information Modelling	Project Management	Art Appreciation
Architectural Graphics and Drawing	Structural Design and Systems	Digital Graphics and Art	Dissertation /Seminar/ Research Methodology	Green Buildings and Rating Systems
History of Architecture and Culture	Climatology	Entrepreneurship Skills for Architects		Graphic and Product Design
Principles/ Theory of Architecture	Building Services	Foreign Language		Disaster Mitigation and Management
Urban Design	Surveying and Levelling			Contemporary Processes in Architecture
Human Settlements Planning	Acoustics			Disaster Mitigation and Management
Housing	Environmental lab			Architectural Journalism
Landscape Design	Environmental Science for Architecture			Architectural Design with Steel and glass
Site Planning				Art in Architecture
Carpentry and Model Making Workshop				Sustainable Cities and Communities
Specifications, Cost Estimation and Budgeting				Building Performance and Compliance

Table 1: Categorisation of Architectural Courses as per COA guidelines

2. Outline by COA

Council of Architecture (COA) is a regulatory body that controls architectural education in India and provides guidelines for curriculum development. The recent guidelines by COA 2020 and previously published as 2017 draft, categorises the various courses under three broad categories such as compulsory studied courses, enhancement courses and electives (Figure 5). Further, each course has been divided into two categories. Compulsory studied courses into ‘professional core’ and ‘building Science and applied engineering’;

enhancement courses into ‘skill’ as well as ‘ability’ enhancement; and electives into ‘open’ and ‘professional’ electives.

The architectural courses suggested and categorised by the Council of Architecture have been listed in **Table 1**.

Conceptual Framework

This study develops a conceptual framework (**Figure 6**) which helps to understand categorisation of architectural courses according to three domains of Bloom’s Taxonomy.

The framework of courses within the Council of Architecture can be put categorising the three domains of Bloom’s Taxonomy. Professional Core and Building Science and Applied Engineering subjects are addressing the fundamental, factual, conceptual, procedural, Meta-cognitive knowledge of courses. Skill and ability enhancement courses leading to the psychomotor domain of Bloom’s Taxonomy whereas electives add values to the subjects offered addressing affective domain. Thus, the overall structure demonstrates the application of Bloom’s Taxonomy.

According to Ellington et.al (1984), an issue with Bloom’s area developments is that it is by no means simple to decide into which category particular actions or objectives belong. Many can be justified as belonging to more than one domain.

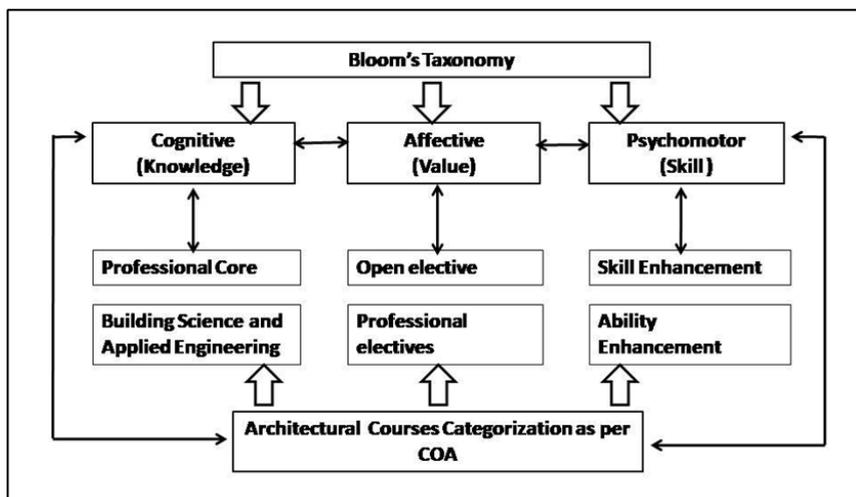


Figure 6: Conceptual Framework for Curriculum Design:
Bloom’s Taxonomy and Courses in architecture education
Source: Author

Cognitive, Affective, Psychomotor	Cognitive	Psychomotor	Affective
Architecture Design	Climatology	Carpentry and model making workshop	Open electives
Building Construction	Building services	Communication skill	Professional electives
Urban Design	Structural design and Systems	Computer skill	
Basic design and visual arts	History of architecture and culture	Management skill	
Architectural Graphics and drawings	Principals /theory of architecture	Entrepreneurship skill	
Specification, cost estimation and Budgeting	Human settlements	Research skill	
	Housing	Professional practice	
	Building Materials	Practical training	
	Environmental science of Architecture	Seminar/dissertation	
	Applied mechanics		
Professional Core, Building Science and Applied Engineering		Skill and Ability Enhancement Courses	Electives

Table 2: Categorisation of Architectural Courses as per Bloom's Taxonomy

But some decade later the chief advantages of Bloom's work are related with more prominent thoughtfulness regarding the accuracy of the working out of destinations and the exact nature of intended learning outcomes. Based on the course outcomes and literature review the categorisation of architectural courses in regards to Bloom's Taxonomy has been shown in **Table 2**.

Courses tending to knowledge like factual knowledge, conceptual knowledge and procedural knowledge have been sorted in the area of cognitive. While, the courses building up abilities and skills are categorised under the psychomotor domain. Furthermore, the courses which develop positive attitude towards the core courses have been categorised in affective domain. Many of courses can fit in all the three domains of Bloom's Taxonomy.

Courses such as Building construction and materials, Elective and Carpentry and Model making Workshop representing each of the cognitive, affective and psychomotor domains are explained to give example application of the suggested framework. Case of Building Construction and Materials gearing the cognitive is explained. Its relation to affective and psychomotor domain is also described in the following sections.

1. Courses Gearing the Cognitive Domain

Under this aspect, courses addressing the various kinds of knowledge are conceptualised as cognitive courses. Focusing on the objectives of compulsory studied courses suggested by the Council of Architecture which are addressing the fundamental knowledge of architecture education they are conceptualized as cognitive courses. It includes professional core courses as well as its supporting building science and applied engineering. The courses in architecture education such as climatology, building services, structural design and systems, history of architecture and culture, principals /theory of architecture, human settlements, housing, building materials, environmental science, applied mechanics have been addressing anyone or more than one of the dimensions of the cognitive domain (**Figure 2**). Therefore, they have been categorised under the Cognitive domain. The courses such as Architectural Design, Building Construction, Urban Design, Architectural Drawing Graphics, Basic design, Specification, cost estimation and budgeting are not only the exclusive to knowledge but also there is certain overlap.

Case of 'Building Construction and Materials' gearing cognitive domain

While designing the course contents of Building Construction and Materials, there is a need to consider three pre-requisites of construction; construction materials, construction methods and construction principles. In Architecture Education, there are certain rules to connect different parts together and avoid it from falling apart which can be called as construction principles. The journey of learning or intellectual thinking should be from lower level to higher level of cognitive classification containing remembering, understanding, applying, analysing, evaluating and creating as per the revised Bloom's Taxonomy. American Educational psychologist Krathwohl restructured and changed taxonomy classification from nouns to verbs in 2001 (Anderson et.al, 2001).

The learner should be able to achieve learning outcomes according to the hierarchical order of Bloom's Taxonomy in order to measure breadth and depth of learning of the learners at the end of the course. If the idea or concept of construction principles, for example 'concept of spanning' which urges to understand the structural stability as per the structural span for the topic 'floor and roof' is introduced while designing, learner will **remember** it before the **understanding**. Learners will **apply** the concept while making sheet or model of construction. In next stage they will be able to **analyse** the proprieties of materials and select the appropriate material and methods according to the span. Next to it learners will be able to judge or **evaluate** the stability of the floor and will be able to **create** their own construction method rather than copying method same as mentioned in book. The learners will be able to complete these course outcomes at the completion of course.

It has been observed that few teachers had not been acquainting learners with the construction principles in teaching practices (Dhepe & Choudhary, 2013). If the contents of building construction are designed by incorporating construction principles, it will develop the content of building construction as course as well as cognitive domain of learner.

Incorporation of construction principles in the course content will be helpful to develop rational thinking of learners understanding the why, the existence and stability of elements. This will not limit the course outcome up to application category of Bloom's taxonomy but travelling learners up to synthesis, evaluation and making them free for generating innovative construction details. They will be able to relate the 'Construction' as course to 'Theory of Structure'; design etc.

2. Courses Gearing the Affective Domain

Normally the learner's attitude, the feeling is bordered by the affective domain. Elective courses enhance the learner's choice and help them to add value to the compulsory studied courses. Considering the learners' interests and objectives put forth by COA regarding the elective courses, they can be conceptualized as affective courses in architecture education. As COA electives are categorised as an open elective which is from other disciplinary and professional electives which are adding value to the courses of architecture education. As first-year students may not be accustomed to the scope of architecture, interdisciplinary courses or open electives could be offered at the initial stage of learning to help students to pursue their interest. Later, professional electives can be offered to expand the horizon of knowledge or to gain specialised knowledge. Therefore, the open and professional electives have been categorised under the affective domain. So that learner will rise to various levels from lower to higher of the affective classification of Bloom's Taxonomy.

Case of 'Elective' (Traditional Architecture) gearing affective domain

If the learner is interested in Traditional Architecture, but has a dilemma to follow it or not. Sometimes, someone views it as backward and learner is unable to forward it in the current situation. Even most of the institutes knows the importance but not been offered it as course in the curriculum. In that case need is to charge the learner and curriculum emotionally.

If 'Traditional Architecture' as one of the professional electives will be offered in the curriculum and imparts the importance, information leading to knowledge and wisdom. Then the learner will **receive** information attentively, read and listen as he or she has chosen it according to interest. Then they will actively **respond** to it through the assignments or class room activities assigned such as question answer; presentation; case study. After that, learners will understand the importance of traditions and elements of, methods, techniques, essence of traditional architecture and start to follow its **value**. Then they will **organise** the different values such as social value, cultural value, climatic value, functional value, structural value. they will prioritise these values and decides what is right or appropriate to design or integrate. They will accept the different viewpoints and relates with other values. Next to this learners' nature will become to adopt the character,

Affective	Learner will be able to:
Receiving	Identify and describe the aspects or issues of offered contents
Responding	Report the case study
Valuing	Justify their ideas /opinions in relation to contents of elective
Organizing	Document and present the data collected in systematic way
Internalizing	Display a technical base through in depth study.

Table 3: Course outcomes of ‘Open Electives’ in regards to ‘Affective Domain’

essence of the element of Traditional Architecture. They will be able to integrate it in present-day built environment either as concrete element or abstract essence. Thus, by **characterising**, learner’s positive attitude towards the tradition, traditional material and techniques will develop. The attitude towards social and cultural values of local and nation also change. Students will consider the subject worthwhile with inner conviction.

Similarly, **Table 3** shows the example of course outcomes of ‘Open Electives’ designed by the first author in the syllabus of Bharati Vidyapeeth Deemed University for first year B.Arch (Course 2020 pattern).

3. Courses Gearing the Psychomotor Domain

The study considers ‘skill and ability enhancement courses’ under the psychomotor domain of Bloom’s Taxonomy. The courses addressing the skills such as communication skill, entrepreneurship skill, management skill, computer skill, building information modelling have been included under the psychomotor domain. Practical abilities as proposed by Ellington et.al (1984) have been considered in this domain, so courses such as practical training, professional practice, research in architecture, dissertation, seminar etc.

Carpentry and model making workshop, which intends to motor skills therefore categorised under skill enhancement course whereas COA has categorised it under compulsorily studied courses. Cruzon (2004), stated that skill is the coordination of mind and muscle; skilled performance is the amalgamation of the motor (MC) and perceptual components (PC). Thus, Carpentry and model making workshop as course involve high MC and relatively low PC.

Case of ‘Workshop’ gearing psychomotor domain

In workshop as a course, the students **imitate** to use required tools as demonstrated by the instructor during model making or drafting the drawing. At **manipulation level** learner starts to develop the skill to use tool according to their own ability and limitation. Next to

Psychomotor	Learner will be able to:
Imitation	Observe the nature and texture of different materials
Manipulation	Replicate forms in drawings by making models
Precision	Choose tools and joinery techniques required for model making
Articulation	Construct or Compose three dimensional forms using different model making materials and equipment's in different scale.
Naturalization	Make everyday objects, some building elements, and building forms with a wide variety of available materials and handle simple tools in carpentry.

Table 4: Course outcomes of 'Workshop' in regards to 'Psychomotor Domain'

it, by practicing or doing repeatedly the learner will become more exact and reach the level of refinement or **precision**. At the **articulate** level, learner coordinates the series of actions for achieving harmony such as handling T-square, set-squares, pencils etc. while drafting or cutting the material, pressing the material, pasting the materials during model making. Thus, this course needs to be designed considering the various skills like joinery, cutting, finishing etc. to make various types of architectural models such as site model, block model, finished model using various tools and materials. The example of course outcomes of workshop designed at Bharati Vidyapeeth Deemed University for first year B. Arch. (Course 2020 pattern) 'Workshop' course is written in the **Table 4**.

4. Courses Gearing the Cognitive, Affective and Psychomotor Domain

Patil & Gaurshettiwar (2016) depicted building construction subject in architecture education and its relation to Bloom's Taxonomy, travelling from the cognitive to the affective and finally the psychomotor domain. The knowledge and skills learned in other subjects of architecture education are applied in design (Chakradeo, 2010). So, the seeds of thinking either logically or creatively, sowed in other subjects of architecture education should flourish and develop in the design studio.

Design is also a decision-making process dependent on a set of information. Hence, architecture design is addressing three domains of Bloom's Taxonomy. Knowledge has been categorised into 'universal knowledge' and 'local knowledge'; skill into the reproduction of drawing and building and professional skills (Chakradeo, 2010). Thus, the studio subjects, where knowledge and skill need to apply with adding value to the society, culture, nation, and universe, learning outcomes should be addressed to three domains. Considering the course outcome suggested by COA and dimensions of three domains suggested by different authors, the rest of the courses need to address the Cognitive, Affective and Psychomotor domain as shown in **Table 2**.

Case of Building Construction and Materials Gearing Cognitive, Affective and psychomotor Domain

The case of Building Construction and Materials as a course and its cognitive domain is shown earlier. By introducing construction principles, not only cognitive domain of will be developed but also the attitude, tendency of learner will be changed from copying details as mentioned in the text book towards preparing details of their own.

After **receiving** the information regarding construction principles, learners will **respond** showing application of it and follow its value; understand its importance while making model. Then they will be able to **organise** or order the structural value, material value, importance of connecting the parts together. Then their **character** will become to design their own methods and change the attitude from copying from the text books towards creating details by rational thinking.

In Building construction making drawings is also important part which gears psychomotor domain. Learners reflect skill of drafting while making drawings and craft as skill of construction while making construction models, under this domain. First, the learner may **imitate** as demonstrated in books or by the instructor. Then they can develop their own skill in the stage of **manipulation**. they can **refine** skill by experimentation. They will be able to **articulate** the series of actions in craft such as providing stability, connecting different elements and materials simultaneously. **Internalising** this, they can make fine model of types of floor.

Thus, if the curriculum and course are designed as per the above conceptual framework, it will develop the cognitive, affective and psychomotor domains of learners. While designing the curriculum the three concepts -- knowledge, skill and ethics need to be inculcated as learning outcomes in learning materials or course contents. The categorisation of course framework should reflect what the students must know, should know and could know. Thus, covering the framework suggested by UGC and COA, the following procedure to be followed for curriculum design.

- Identifying outcome at global, programme and course level
- A categorisation of courses within the framework of Blooms focusing on course outcome.
- Incorporating the courses considering the stage of learning. Vertical progression and horizontal integration considering the stage of development of learning.
- Facilitating Students Choice
- Defining contact hours considering the duration required for learning
- Credits assigning concerning the time duration
- Assessment or evaluation scheme based on objectives and outcomes

Conclusion

This study has developed a framework for architectural education using Bloom's perspective within the guidelines provided by COA. It has also demonstrated its application taking examples of courses under three domains. Designing of the curriculum within the framework of taxonomy inculcates knowledge, skill and values in learners and develops cognitive, affective and psychomotor domain which make sense to the curriculum design. Depending on the objectives of the institution and universities the categorisation may change but will address the innovative curriculum design involving its three aspects such as what is desired; what is possible with techniques and what is viable. Application of Bloom's taxonomy at the instructional level is helpful to develop the learner but if applied while designing courses and course contents it will not only develop the learner but also learning material as course contents. ■

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