

UNIT-I

AIMS AND OBJECTIVES OF TEACHING COMPUTER SCIENCE

Introduction

Computer technology is used in almost every sector of everyday life, including business, laboratories, educational institutions, research etc. In the current world it is almost impossible to imagine that someone can live without computers. Today, everything related to your everyday life can be done using computers. As the 21st century looms ahead, it is clear to see that it has advancements that humanity may never have dreamed of and one of these shining developments is the well-recognized “Computer”

Meaning

In the beginning computer was able to perform only mathematical calculation but now it can do variety of tasks. So we can say that computer is an electronic device, which works under a set of instructions automatically accepts the supplied data, process and analyses the data and produces the information.

Computer science deals with the theoretical foundations of information and computation, together with practical techniques for the implementation and application of these foundations. Computer science is the study of the theory, experimentation, and engineering that form the basis for the design and use of computers. It is the scientific and practical approach to computation and its applications and the systematic study of the feasibility, structure, expression, and mechanization of the methodical procedures that underlie the acquisition, representation, processing, storage, communication of, and access to information.

Nature and Scope

Change is said to be the law of nature that is brought into practices through the services of science. As science remains constantly busy in bringing changes in its body of knowledge, ways of investigation and the fruits of its investigation. As a result, the nature and scope of computer science always remains in the state of flux. Therefore, it becomes imperative to have up to date knowledge about the evolving concept of the nature and scope of the computer sciences.

- What are major thrust areas at present in computer sciences?
- In what way, modern communities have been influenced by the ongoing development and progress in computer sciences?
- How the development in computer science has helped in globalization?
- What have been the various path tracking discoveries and landmark development in computer science?
- Who have been the men (scientists) behind the scientific progress both from India and abroad?
- What types of avenues and professions are said to be available through one or the other specialization in computer sciences?

Let us try to think over these issues for being acquainted with the nature of scope of computer sciences in modern context.

A. Trust Areas in computer sciences

Some of the major thrust areas in computer sciences at the present juncture may be named as below:

1. Alternate sources of Energy.
2. Water sources management.
3. Super conductivity, super fluidity and low temperature phenomena.
4. Plasma Physical and plasma diagnostic teaching.
5. Holography and optical information processing
6. Applied optics.
7. Fusion reactors.
8. Thermo nuclear energy production.
9. The fiber optics communication technology.
10. Laser engineering.
11. Material science – development of non-load bearing and load bearing material.
12. Optical and IR Astronomy.

13. Middle Atmosphere Studies.

B. Impact of computer sciences on modern communities

Development and progress in the field of computer sciences has influenced the life and livings of the modern communities and society in so many ways like below:

1. Construction of Buildings and Residential Colonies

On account of the availability of a variety of load bearable and non-load bearable material through the development in computer sciences, the modern communities look modern in terms of the construction of their buildings in the form of business centers, offices and residential colonies.

2. Transportation and communication systems

Development in computer science has been able to provide the latest available transportation and communication systems to the modern communities. The distances are no more a barrier for the people living at the farthest distances of the globe.

3. Modernization of the systems of food production and its availability to the people

The development in the computer sciences have modernized the sources of availability of food stuff in the shape of modernization of the method of framing, poultry farming, cattle, fisheries, bee keeping etc. it has resulted in multiplying the production of the food stuff as well as reducing the complexities or manual labour. The food stuff cannot be better preserved through the modern technique available as a result of invention and discoveries in computer sciences.

4. Water sources management and its purification

Development in computer sciences is helping the modern communities to take care of their water resources. It has provided artificial irrigation means as well as availability of drinking water with the construction of big water reservoirs, dams and sophisticated distribution system. It has provided big plants and simple household gadgets for the arability of pure drinking water to the modern communities. It has also provided means to have artificial rains and cultivation of water for providing additional sources of water to the modern communities.

5. Modern means for the entertainment and leisure time hobbies

Development in computer science has provided modern and methods for the entertainment and uplifting of leisure to the modern communities. Radio, Television video, Films and computer services have taken a total command of providing entertainment and leisure time hobbies to the modern communities.

6. Health care and treatment of diseases

Development in computer sciences has helped much in taking care of the health including treatment of illness and diseases of the members of the modern communities. It has provided better knowledge and information for the prevention and care of the diseases as well maintenance of good physical and mental health through its wider network of information technology. With the vast discoveries and invention in the field of health and medical sciences as well as tremendous progress in chemical sciences. Modern communities can avail the latest treatment of the diseases and look after their health.

7. Development of inter-relationship and dependence

Development of computer sciences is responsible for making the modern communities too much inter-related and inter-dependent. It has given birth to the phenomenon of globalization in every aspect physical, mental, emotional, social and cultural of the behaviour person belonging to the modern communities of this globe.

With all what has been said above, we should not conclude the developments in computer sciences are always bound to cast positive and desirable impact wellbeing and progress of the modern communities. If handle improperly and utilized destructively these can yield bitter and horrifying results. Such negative impact of the development computer sciences on modern communities may be summarized as below:

- Too much urbanization of the communities.
- Causing heavy pollution of every sort like air pollution, water pollution, noise pollution, cultural pollution etc.
- Inequitable distribution of wealth and other material comforts in the population.
- Abolishment of the concept and existence of the harming of health and welfare of the people.

- Development of the weapons of destruction and their unmindful application.
- Side effects of the fertilizer, chemicals, pesticides insecticides used in growing foodstuff and killing harmful bio-stuff.
- Neglect of moral values and social responsibilities at the cost of material development and individualism.

C. Globalization and computer sciences:

The term globalization derived from the words 'globe' and 'signifies' the removal of barriers of distance or of other nature for bringing people of the world together in terms of their relationships of event. For the understanding of its meaning let us think over on a few definitions given below:

1. The sociologist, Anthony Giddens, defines globalization as a decoupling of space and time, emphasizing that with instantaneous communications, knowledge and culture can be shared around the world simultaneously.
2. The Dutch academician Rudd Lubbers defines it as process in which geographical distance become of diminishing importance in the establishment and maintenance of cross economic, political and socio-cultural relations.

• Aims and Objectives of Teaching Computer Science in Schools

Technology has struggled to find its way into the classroom in all sorts of ways, from projectors and Television to Computer labs and student laptops. Along with improving the way of the students are taught, it is also vitally important that students learn to use computers have become as common as the pencil and paper. Students who use computers have been shown to attend the school more steadily and perform better than students who do not use computers. Computer usage makes students to become more focused on their work on their work at home, in collaborative projects with other students and on their own. The following are some chief aims and objectives of teaching Computer Science

- Arousing and maintaining interest
- Developing the ability to reach generalizations and to apply them for solving everyday problems.
- Developing interest in hobbies related to computer's their generations and so on.
- To develop scientific attitude.

- To familiarize the student with the world in which he is living and to make them understand the impact of computer science on society, so as to enable them to adjust them self to the environment.
- **Need and significance of teaching Computer Science**

The need to use computer and learn computer science in everyday life and in workplace has become very vital and important.

Computer science for the scientific and technology purposes: The Digital age needs Computer Scientists. Modernizing Education has benefited from the inclusion of technology and computers by making it easier for Computer science is driving development from the sciences to expressions of the human experience. A gander at any significant news source uncovers the impact of Computer Science and innovation on the worldwide economy. Barely characterized, Computer science depends on a center arrangement of critical thinking ideas; it has been characterized as "the investigation of PCs and algorithmic procedures, including their standards, their equipment and programming outlines, their applications, and their effect on society" (Association of Computing Machinery, 2003). Be that as it may, it doesn't stop there. Computer science is a lens and passages into abilities in basic and intelligent believing that apply over all orders, including composing and the humanities (Carey, 2010).

The contentions for Computer Science training fall into two primary classes: Learning key apparatuses for the web age, and figuring out how to comprehend the world by comprehension media.

Today, in the period of web 2.0, we are very prone to consider online networking, messaging, and email as regular media you utilize as often as possible.

Today PCs assume a crucial part in industry, business, government, research, training, prescription, correspondence frameworks, excitement and numerous different zones of our public. Experts who add to the configuration, improvement, investigation, detail, confirmation, support and assessment of the various uses of PC frameworks significantly affect society, making along these lines valuable commitments to society, additionally, conceivably, some less positive.

To guarantee that their endeavors will be utilized for the general great, registering experts must submit themselves to making processing an advantageous and regarded calling, elevating a moral way to deal with their expert practice.

Today from cell phone alarm that wakes them to the tablets used to chat with friends and complete homework, today's students are surrounded by computer technology.

- Professional Development
- Career Education
- Student Incentives
- Mentor Programs
- Coding for Kids

Therefore, Computer is inseparable from the future of Our society.

Values of Teaching Computer Science

The real values of Teaching Computer Science in our modern world can be quite obvious from chief values which are described below.

Practical values

Utilization of the various facts drawn from the study of computer science in modern life has revolutionized our life. Today we cannot find even a single thing which is left untouched by the hands of computer. Uses of computers in transportation and communication have shortened the world.

Social values

Computers have achieved the best place in the society as well. They form the foundations of so many professions like medicines, Engineers, etc. Computers are highly helpful to the society. Lots and lots of social changes have taken place after the introduction of computers. The study of computers science develops in us honesty, truthfulness and critical reasoning, objective thinking and belief in basic facts.

Disciplinary value

The learning of computer science involves some scientific discipline and scientific attitudes which are transferable to our later life also. It involves self-expression, creativeness, open

mindedness, critical thinking and observation suspended judgement which are free from superstitious and false beliefs etc. The good habits if they are once developed in a child can prove beneficial for their later life.

Cultural value

The role of computers in the development of modern civilization can be obvious just by our comparison with our ancestors. Our present culture and advancement in our standard of living gives a clear-cut picture of our cultural development and role of computers in this field for removing old traditional beliefs and superstitions. Computers have proved itself as in best helper in overhauling the consciousness of the universe.

So at the end, from the above mentioned values of computer science, we come to this conclusion that computer science has achieved a most important place in our place in our daily life as well as in the modern establishment of the whole world.

Conclusion

The computer is widely used in the field of education and computer science has developed which is very popular these days. At every stage computer is compulsory. The distance education is using computer for instructional purpose as multimedia approach. The computer makes teacher learning process effective by involving audio and visual sense of learners. So, this unit tells about the nature and scope of Computer Science, the need and significance of teaching Computer science.

Instructional objectives

Instructional objectives are specific, measurable, short-term, observable student behaviors. They indicate the desirable knowledge, skills, or attitudes to be gained. An instructional objective is the focal point of a lesson plan.

Instructional objectives are important because of the following: They provide a guide for choosing subject matter (content) to be taught, in designing appropriate teaching methods and selection of learning materials depending on the amount of content to be covered. They help in allocating teaching time.

Behavioural Objectives

It is also referred to as a behavioral objective or an instructional objective. Instructional objectives are specific, measurable, short-term, observable student behaviors. They indicate the desirable knowledge, skills, or attitudes to be gained. An instructional objective is the focal point of a lesson plan. A behavioral objective is a learning outcome stated in measurable terms, which gives direction to the learner's experience and becomes the basis for student evaluation. Objectives may vary in several respects. ... Cognitive objectives emphasize intellectual outcomes, such as knowledge, understanding, and thinking skills.

Need and Importance of Instructional Objectives

Instruction in which the specification of instructional objectives plays a key role. Objectives are important to both learners and instructors. They help learners plan their study and prepare for examinations. They guide the instructors in planning instruction and devising tests.

Bloom's Taxonomy of Educational Objectives

Benjamin Bloom and his co workers at the University of Chicago (USA) established that the change of behaviour is of three types (i.e) Cognitive, affective and psychomotor. Therefore, educational objectives are of three categories namely (i) cognitive domain objectives (ii) affective domain objectives and (iii) psychomotor domain objectives.

A brief account about these is given below

The cognitive domain includes those educational objectives, which are related to the recall of knowledge and the development of intellectual abilities and skills. If a pupil can comprehend the meaning of the piece of information to the point that he can grasp the relationship among them, restate them in his own words and take action intelligently on the basis of them, then he has developed his intellectual ability.

Cognitive domain objectives

cognitive domain objectives have six categories which are as follows

- **Knowledge-**

The knowledge objective emphasises the recall of methods and process, pattern, structure, setting and the psychological processes of remembering. For example - knowledge of specific universals and abstractions in a field, knowledge of isolated

facts, information, Trends, sequence, principles and generalisation and other applications.

- **Comprehension**

This objective emphasizes a type of understanding such that individual nose what is being communicated and can make use of the material or Idea being communicated without necessarily relating it to other material or seeing its full list implications. for example, translation (from one verbal form to another interpretation explanation extra pollution which includes behaviour like drawing conclusions predictions etc)

- **Application**

This means ability to use ideas principles to solve abstract or concrete problem

- **Analysis**

The breakdown of a communication into its constant elements such that ideas are made clear example analysis of element organisational principle.

- **Synthesis**

These symbols putting elements are parts so as to form a Whole are pattern are structure which was not clear before

- **Evaluation**

Evaluation means quantitative and qualitative judgement about the value of material or methods for a given purpose

Affective domain objectives

The affective domain focuses on the attitudes, values, interests, and appreciation of learners. The hierarchy associated with it begins with receiving and listening to information, and extends to characterization or internalizing values and acting upon them. It focuses on helping learners understand what their own values are and how they have developed.

5 chief categories of Affective domain are

- **Receiving (Attending)**

This is the first step of the learner to be properly oriented to learn what the teacher in tense that he will example awareness willingness to receive and controlled or attention

- **Sample learning outcome:** Listen to other students with respect.
- **Sample assessment/activity:** Be an audience member to another student's presentation, and then write a summary.
- **Rationale:** Through this assignment, learners will learn how to listen effectively to

others as well as remember key details about their presentation (used in writing the summary).

- **Responding**

The people are sufficiently motivated that he is not just willing to attend but to attend actively. this is also called as interest objective.

- **Sample learning outcome:** Speak effectively in front of an audience and actively respond to others.
- **Sample assessment/activity:** Present on a subject in front of the class, and answer questions from peers about their presentation.
- **Rationale:** Through this, learners will become more comfortable with public speaking as well as more comfortable with contributing to a discussion in the form of answering questions.

- **Valuing**

It means individuals own Valuing or assessment of think, phenomena are behaviour. many persons use attitude in place of value.

- **Sample learning outcome:** Demonstrate and explain own values regarding various topics.
- **Sample assessment/activity:** Write an opinion piece on any issue, explaining one's own stance and reasons supporting that stance.
- **Rationale:** Through this, learners will explore not only their own values but why they support their values, giving them a chance to understand more fully their own value system.

- **Organisation**

This category per times to the building of your system of values example conceptualization of value or organisation of value.

- **Sample learning outcome:** Compare value systems and understand evidence behind values.
- **Sample assessment/activity:** Organize and compare different cultural value systems, evaluating the differences between them and why these differences may have arisen.

- **Rationale:** In doing this activity, learners will consider how value systems are put into place and organized, as well as the evidence that supports different value systems across the world.
- **Characterization by a value or value complex**
It means integration of beliefs ideas and attitudes into a total philosophy our world view. For example: generalization and characterization.
 - **Sample learning outcome:** Work well in a team of peers.
 - **Sample assessment/activity:** A group project, including group work on any assignment.
 - **Rationale:** By working in a group, learners must balance their own values with the values of the team, as well as prioritize tasks and practice teamwork.

Psycho motor the domain objectives

The psychomotor domain encompasses the ability of learners to physically accomplish tasks and perform movement and skills.

There are 6 categories of this domain

- **Reflex moment**

Those moments which are involuntary in nature. They are functional at birth developing through maturation example segmental reflexes.

- **Sample learning outcome:** Instinctively respond to a physical stimulus.
- **Sample assessment/activity:** A game of dodgeball.
- **Rationale:** Learners must react (dodge) the balls that are being thrown at them, allowing them to develop their reflexive skills.

- **Basic fundamental moments**

Those inherent movement patterns which form the basis for specialised Complex skilled movement. example -locomotor movements, not locomotor moments and manipulative moment.

- **Sample learning outcome:** Perform a simple action (including running and throwing).
- **Sample assessment/activity:** A game of dodgeball.

- **Rationale:** Learners must run and throw to actively engage the opposing team, allowing them to develop these skills.

Perpetual abilities

All those abilities of the learner which impinge upon him to be carried to the higher brain centres for interpretation. for example, visual and auditory discrimination.

- **Sample learning outcome:** Use more than one ability to integrate different sensory perceptions.
- **Sample assessment/activity:** A game of catch or soccer (or other game involving movement and passing).
- **Rationale:** Learners must integrate running, visual information about the position of the ball, and predictive information about the future position of the ball.

- **Physical abilities**

For example strength and flexibility

- **Sample learning outcome:** Sustain an activity for a set period of time.
- **Sample assessment/activity:** Run for 25 minutes steadily.
- **Rationale:** This activity is a measure of the learner's stamina and physical fitness.

- **Skilled movements**

All sports skills, dance skills and manipulative skills fall in this category

- **Sample learning outcome:** Adapt one's behaviour and movement to better achieve goals.
- **Sample assessment/activity:** A soccer or other strategic game (football, hockey).
- **Rationale:** This activity allows teams to change their strategy and individuals to change their physical behaviour depending on the response of the other team.

- **Non discussing Communications**

This includes facial expressions, postures gestures expressive and interpretive movements.

- **Sample learning outcome:** Express oneself through purposeful movement and activity.
- **Sample assessment/activity:** A soccer or other strategic game (football, hockey)
- **Rationale:** These games all involve teamwork, strategy, and integrative and purposeful movement. Successful teams must integrate all of their senses, communicate through movement, and use a variety of adaptive strategies.

With the passage of time professor Bloom approach got modified and lesson plans written under this approach contained

1. Teaching points
2. Instructional objectives
3. Teacher's activities
4. Students' activities
5. Teaching aids and
6. Evaluation

Merits and Demerits of Blooms approach

The merits of Bloom's approach as follows

1. The objectives are to be given in terms of behavioural changes
2. The teaching points have to be stated in clear terms
3. Emphasize is played on the evaluation of the desired objectives in behavioural terms
4. Teaching aids are carefully related to make the lesson effective
5. The approaches based on genuine psychological rules and theories of learning
6. Teacher's activities and students' activities are given separately

The demerits of Bloom's approach are as follows

1. The teacher has a dominating role in this approach
2. The teacher has to be very careful to integrate the three facts objectives learning experiences and evaluation which is no ordinary job to do. Teachers have not been trained for it.
3. Generally, learn as feel lot of difficulty in writing objective in behavioural terms
4. A strict following of various steps involved in lesson planning takes away all joy and innovation

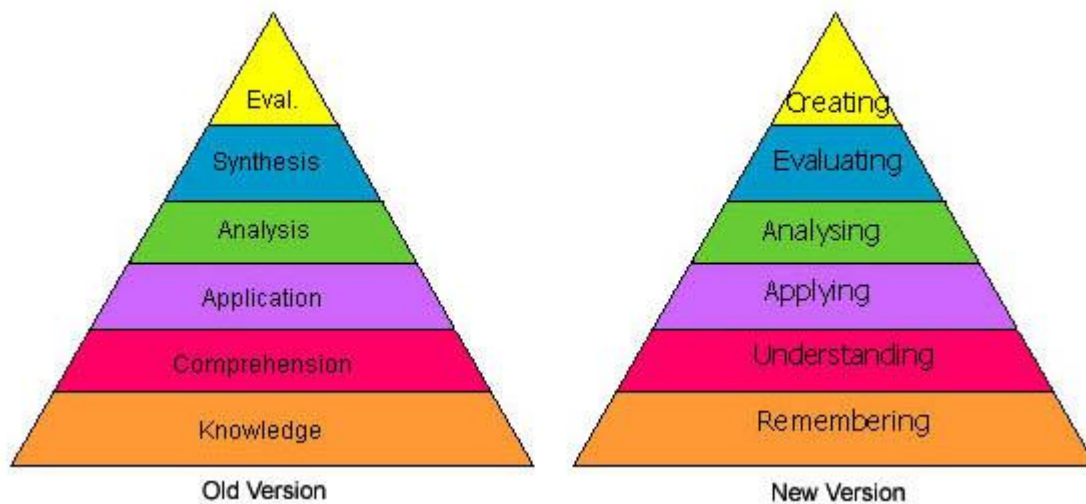
5. There are hardly any standard criteria for determining teaching and testing points.
6. There is not much objectivity in writing objectives and evaluating the content.

Revised Blooms Taxonomy

In 2001, David Krathwohl (one of Bloom's original collaborators) and co-editor Lorin Anderson published a revision to the 1956 hierarchy with contributions from cognitive psychologists, curriculum theorists, instructional researchers, and testing and assessment specialists. This new revised version introduced a key change to the cognitive domain of Bloom's Taxonomy: it shifted the language used from nouns to verbs.

The cognitive process dimension represents a continuum of increasing cognitive complexity—from remember to create. Anderson and Krathwohl identify 19 specific cognitive processes that further clarify the bounds of the six categories.

Bloom's six major categories were changed from noun to verb forms. Additionally, the lowest level of the original, knowledge was renamed and became remembering. Finally, comprehension and synthesis were retitled to understanding and creating.



- **Remember**

- **Sample learning outcome:** Remember the names and relationships of a cast of characters in a play.
- **Sample assessment/activity:** A multiple-choice test designed to test the memory of learners.
- **Rationale:** A multiple-choice test will allow educators to see whether students have effectively memorized the given material.

- **Understand**

- **Sample learning outcome:** Understand and explain the main ideas of a play or piece of literature.
- **Sample assessment/activity:** Write a short (1 page) paper summarizing the plot and most important events in the play.
- **Rationale:** Writing a summary encourages learners to think about what the most important parts of a piece of literature are, and to decide which aspects of the plot to disregard in favor of a concise summary. It allows educators to evaluate whether or not they have understood the main idea of the play.

- **Apply**

- **Sample learning outcome:** Apply the main ideas/themes in the play to another context.
- **Sample assessment/activity:** Write an advice column responding to one of the characters.
- **Rationale:** In doing this assignment, learners will consider the implications of a character's actions outside of the consequences shown in the play.

- **Analyze**

- **Sample learning outcome:** Be able to analyze the relative roles of each character in the play and their relationships to each other.
- **Sample assessment/activity:** Write an analytical paper comparing the antagonists and protagonists of the play.
- **Rationale:** Through this assignment, as learners consider what makes each character an antagonist or a protagonist, they need to use both their knowledge of the play and critical thinking skills.

- **Evaluate**

- **Sample learning outcome:** Evaluate the decisions of characters in the play, and support your evaluation with textual evidence.
- **Sample assessment/activity:** Write a response to one of the events in the play, either supporting or rejecting their actions on the basis of evidence from the play as well as personal opinion and projected/actual consequences of action.

- **Rationale:** Through this assignment, learners will consider the rationale and consequences for actions in the play, leading them to understand and make judgements about the validity of a character's decision making.
- **Create**
 - **Sample learning outcome:** Create a new and unique piece of writing using similar plot devices.
 - **Sample assessment/activity:** Create a short story using similar plot devices in a new time or setting.
 - **Rationale:** Through this activity, learners must integrate the plot devices and writing techniques into a new setting, allowing them to practice their creative writing skills and showing their full understanding of the writer's techniques.

Interrelation among the domains

Learning helps develop and intelligence attitude as well as encourage the acquisition of new knowledge and new skills. Learning can generally be categorised into three domains cognitive affective and psychomotor. learning is not an event.it is a process. It is the continual growth and change in the brains architecture that results from the ways. We take in information process it connected catalogue it and use it.

Cognitive Development

Cognitive development refers to the way a child grows intellectually assessing academic skills, reasoning and critical thinking abilities under the acquisition of knowledge or learning. difficulties interacting with others as a result of problems and social or emotional development will impede a child's ability to focus. Problems are delays in physical development might impact a child cognitively.

Affective Domain

The affective domain includes the feelings, emotions and attitude of the individuals.

The categories of Affective domain include receiving phenomena responding to phenomena value organised organisation and characterization. The sub domain of receiving phenomena create the Awareness of feelings and emotions as well as the ability to utilise selected attention. This can include listening attentively to lessons in class. The next sub domain of responding to phenomena involves active participation of the learner in class or during group discussion.The ability of the student to priorities value over another and create a unique values system is known as organisation. This can be assessed with the need to value one's academic work as against their social relationships. This helps to control the behaviour of the individual.

Psycho motor domain

This includes utilising motor skills and the ability to them. The subdomains are perception set guided response mechanism, complex over response, adaptation and origination. Perception involves the ability to apply sensory information to motor activities. For example, practising a series of exercises for scoring high marks

Set -set involves the readiness to act upon a series of challenges to overcome them. It includes the ability to imitate a displayed behaviour are utilise at trial and error method to resolve a situation.

Mechanism involves the ability to convert learn to responses into habitual actions with the proficiency and confidence. student having an increased typing speed when using a computer is an example of complex overt response.

Adaptability is an integral part of the domain which exhibits the ability to modify learned skills to meet special events -making a working model. Origination also involves creating new movement patterns for a specific situation.

Cognitive is for mental skills. Affective is for growth in feeling sorry, emotional areas. while psychomotor is manual or physical skills.

The learning domains can be incorporated while designing the course outcomes of all the courses in a program. we can learn mental skills, develop power attitude and acquire new physical skills as we perform the activities of our daily living.

Research in the field establishes the significant relation among three domains of learning

A lesson developed by a teacher requires the inclusion of all three domains in constructing learning task for students. The diversity in such learning task helps create a comparatively well-rounded learning experience that makes your number of learning styles and the learning modalities. It is important for teachers to adapt teaching strategy that combines three domains of learning to enable teaching and learning to be considered as affective. Apply the best suitable delivery techniques that would impact positively on the cognitive, affective and psychomotor domains of the students. The interaction of all three domains is needed for meaningful educational experiences.

For example, teaching economics new knowledge subtends in the cognitive domain.

Using psychomotor domain motor skills sensory organs are used while operating the computer.

with the affective domain components, we give motivation to act upon. A sequence of steps to go for a process acts with efficiency and proficiency and creating new techniques for specific situations. Teachers have to relate two or three domains and perform teaching learning activities and give meaningful learning experiences

Correlation between Subjects

According to Webster's new dictionary of English language correlation means “The act of correlating or the state of being correlated or mutual relation of two or more things or parts”. Thus the word correlation means the reciprocal relationship between various subjects of the curriculum.

