UNIT 1 KNOWLEDGE AND DISCIPLINES

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1.1 INTRODUCTION

Today’s society is generally perceived as ‘knowledge society’. It is observed that the students’ understanding about information and knowledge is almost blurred and they are unable to distinguish information from knowledge. Therefore, there is a need to have clear understanding about the information and knowledge and the differences between them. In this Block, we will discuss the meaning of information, knowledge and discipline. Information means data used in a context and with some relevance. Knowledge is created by attaching meaning to information.

*Note: Few sections of the Unit have been taken from MES 012 - Education: Nature and Purpose, M.A. Education, IGNOU, (2005)*
Knowledge can be defined as an individual’s understanding of the subject matter and its concepts and how these concepts relate to form the larger body of knowledge. Knowledge can also be defined as a set of understanding in a particular domain or a field.

‘The term ‘discipline’ originates from two Latin words ‘discipulus’, which means pupil and ‘disciplina’, which means teaching (noun). Related to it is also the word ‘disciple’ like the disciples of Jesus. The dictionary definition gives a whole range of different meanings of the term, ‘discipline’ such as training, submission to an authority, and self-control of behaviour’ (Krishnan, 2009). Academic discipline can be seen as a form of specific and rigorous scientific discourse.

In addition, ‘discipline’ also means training of one’s own thought. Categorisation of a particular form of knowledge constitutes a discipline. All disciplines have its domain of knowledge, followers and history. A discipline has certain knowledge base and it consists of a substantial body of knowledge. The Unit starts with discussions on understanding knowledge, proceeds to categorise knowledge and finally discusses the formation of disciplines with a knowledge base.

### 1.2 Objectives

After going through this Unit, you will be able to:

- explain the concept of knowledge and its divisions;
- differentiate between knowledge and information;
- explain the sources and the ways and processes of acquisition of knowledge;
- describe the categorization of knowledge;
- explain the concept of a discipline and its formation with a knowledge base;
- discuss the characteristics of a discipline; and
- discuss the implications of knowledge on teaching and learning.

### 1.3 Concept of Knowledge

The nature of knowledge has been a central concern in philosophy from the earliest time. In the history of thought, ‘Theory of Knowledge’ has been considered as a branch of philosophy known as Epistemology. ‘Epistemology’ comes from the Greek word ‘episteme’ meaning knowledge and ‘logos’ meaning discourse or science. Epistemology is an area of philosophy concerned with the nature and justification of human knowledge. It is that field of philosophical inquiry which investigates the origin, nature of knowledge, methods, validity and limits of knowledge. Epistemologists, historically, have concerned themselves with such questions as:

What is knowledge?

What is the structure of knowledge and what are its logical categories?, and so on.

### 1.3.1 Defining Knowledge

According to the most widely accepted definition, knowledge is justified true belief. That, it is a kind of belief, is supported by the fact that both knowledge
and belief can have the same objects and that what is true of someone who believes something to be the case is also true, among other things, of one who knows it. For example, sun rises in the east is the knowledge or true belief which is supported by the fact arrived through daily observations since millions of years.

It is obvious and generally admitted that we can have knowledge only of what is true. If one admits that a proposition (p) is false, it must be admitted that the person did not ‘know’ it and that no one else did, although the person may have thought and said so. Beliefs that merely happen to be true cannot be regarded as knowledge, because knowledge is justified belief.

First of all, knowledge is expressed in propositions. A meaningful sentence that conveys truth or meaning is said to be proposition. For a sentence to be meaningful, the words in a sentence should be meaningful. That is, the concept expressed in the form of words should be true. They should correspond to the state of affairs that is existing at present or existed once upon a time.

A proposition (p) is what the sentence means. Two or more sentences can be used to express the same proposition. It is the proposition that is true or false, but it is the sentence that has meaning or fails to have it. Not every sentence states a proposition. But the sentence that we use asserts something to express proposition. For example,

A square has four sides that are equal.
I know that ice melts on heating.

But in order to understand any proposition, we should first of all know the concept involved in a proposition.

According to John Hospers, there are two requirements for knowing: (a) objective requirement (p must be true) and (b) subjective one (one must believe p). Let us discuss the two requirements for knowing.

### 1.3.2 Requirements of Knowing

(a) A proposition (p) must be true:

One cannot ‘know’ p if p is not true. If one says ‘I know p, but p is not true’ then the statement becomes self-contradictory, for a part what is involved in knowing p is that p is true. Therefore, ‘knowing p means p to be true’.

John Hospers in his analysis of requirements of knowing differentiates the term ‘know’ from other verbs like ‘believe’, ‘wonder’, ‘hope’ and so on. For example, one can wonder whether p is true, and yet p may be false; one can believe that p is true, though p is false and so on. Hospers states that believing, wishing, wondering and hoping are all psychological states, which are occurrent and dispositional in nature. Unlike these psychological states, knowing is not merely a mental state. It requires that the proposition one claims to know is true. But the truth requirement, though necessary is not sufficient. One may not know certain concepts, though they are true, for example, in Physics like ‘energy’ and ‘light wave’ unless one happens to be a specialist in that area though they are true. But the fact that they are true does not imply that one knows them to be true. Though there are many true statements, one may not be a position to know that they are true. There are
other conditions that are required for knowing a proposition.

(b) Not only a proposition (p) must be true, but we must believe that p is true:

This is the subjective requirement, which implies that one must have certain attitude towards p – not merely wondering or speculating about p, but positively believing that p is true. There may be numerous statements that one believes but do not know them to be true. There can be even none which one knows to be true, but does not believe them, since believing is a part (a defining characteristic) of knowing. ‘I know p’ implies ‘I believe p’ and ‘he knows p’ implies ‘he believes p’, for believing is a defining characteristic of knowing. For example, ‘I know that the sun rises in the east’; it implies that I believe in it. But believing p is not a defining characteristic of p’s being true; p can be true even though one does not believe in it.

(c) Necessity of evidence or a reason to believe p:

There is necessary for evidence or a reason to believe a proposition to be true. For example, ‘I know that the sun will rise tomorrow’ and ‘I know that ice melts on heating’. There are excellent reasons or evidences to believe them to be true, because of their certainty. The knowledge that we gain about the physical world through our senses and our judgements about them amount to be true. But there are other kinds of propositions where only self-experience is involved; such as ‘feeling headache’ or ‘feeling drowsy’ or ‘feeling depressed’, to which one may not require evidence. Knowing these propositions is not well covered by the definition of knowing that require evidence. To say; ‘I feel pain’, the experience itself constitutes all the evidence that one requires. One can know the statement to be true, simple on the basis of having an experience. This holds only for propositions reporting the occurrences of sense-experiences. There are also statements, which are analytical in nature for which evidence is not claimed. The statements of this class are called ‘truth of reason’ for which evidence is not required. Even if it is required, it is not in the sense as described above. These are truth in the ‘realm of necessity’. Based on the above analysis of knowledge, one can distinguish three divisions of knowledge which are as follows:

1.3.3 Three Divisions of Knowledge

Based on the way and manner in which it is obtained, knowledge can be classified under three heads:

A Priori Knowledge:

A priori knowledge is knowledge whose truth or falsity can be decided before or without recourse to experience (a priori means ‘before’). Knowledge that is priori has universal validity and once recognised as true (through the use of pure reason) does not require any further evidence. Logical and Mathematical truths are a priori in nature. They do not stand in need of empirical validations.

A Posteriori Knowledge:

A posteriori knowledge is the knowledge based upon observation and experience. This is the knowledge of the scientific method stressing accurate observation and exact descriptions. The propositions that fall under this category can be locked at from the point of view of whether they contain any factual content and from
the standpoint of the criteria employed for deciding their truth or falsity. For example, we have propositions like:

Ice melts.
Snow is white.
Metals conduct heat and electricity.

These propositions give us factual information whose truth or falsity can be decided only through observation and verification. These are called synthetic propositions.

**Experienced Knowledge:**

Experienced knowledge is always tentative and cannot exist prior to experience or be conducted from observation. It must be experienced to have value.

Basic to the three types, is propositional knowledge (a priori and a posteriori) and it is to this type that the structure of knowledge question is addressed. This has important implications to curriculum planning.

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**Check Your Progress 1**

**Notes:**

a) Write your answer in the space given below.

b) Compare your answers with the ones that are given at the end of the unit.

1. Differentiate between ‘a priori’ and ‘a posteriori’ knowledge?

2. Explain ‘experienced knowledge’ with an example.

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**1.4 KNOWLEDGE AND INFORMATION**

Many of us fail to differentiate between the concepts of ‘knowledge’ and ‘information’. Sometimes, we use both synonymously. But both are different in their nature and meaning. There is a connection between ‘information’ and ‘knowledge’. Both these concepts are preceded by understanding of data. Let us see the linkage among these concepts.
Data can be defined as ‘fact’ or ‘description of a phenomenon’. Unless data is interpreted, it has very limited meaning or no meaning at all. For example, the data regarding height or colour of a person or data relating to different crop production in a country in a year can have meaning when they are interpreted and understood in a given context. Therefore, raw data do not provide meaning about a phenomenon.

Information is the interpretation of data pertaining to a given context. It involves manipulation of the raw data. To add meaning to the raw data, many a times, we interpret it, correlate it, and differentiate it from other forms of available data. For example, heights of the students in a particular class constitute the data. When we interpret them in relation to the heights of other students in the group, calculate the average height of the students in the class, compare them with the age of the students, and find out, how many of them are above the average height and how many of them are below the average, it means we are interpreting the data and getting information about the heights of the students. Data on different crop production in a year can simply be defined as data or raw data, but when the data are interpreted relating to a particular context or relevance, like to establish a comparative figure of crop production of the current year with earlier years or compare crop production with the amount of rain fall may be defined as an information. Data is used and organised to create information for certain purpose and use. We get such type of information from the internet, newspaper, or from other media sources.

Knowledge is created by attaching meaning to the information. Information can be used as a necessary medium or material to construct knowledge. Knowledge is information which has been processed and integrated into an existing structure. Dubin (1976), explains ‘information is descriptive while knowledge is predictive, that provides the basis for the prediction of future with certain degree of certainty based on information about the past and the present’.

It can be concluded that, knowledge is created through a process of collection of information and attaching certain meaning to it for a particular purpose by human cognition. Analysing, synthesizing, and consolidating the data; linking it with personal experiences; connecting it with one’s thinking and cognition and presenting it in an understandable form are the processes involved in construction of knowledge. Information itself is not knowledge but it becomes knowledge when meaning is attached to it.

**Check Your Progress 2**

**Notes:**

a) Write your answer in the space given below.

b) Compare your answers with the ones that are given at the end of the unit.

3. Differentiate between Knowledge and Information with suitable examples.

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1.5 SOURCES AND WAYS OF ACQUIRING KNOWLEDGE

There are many ways to acquire knowledge. Some of the major sources of acquiring knowledge are personal experience, reason, tradition, authority and inquiry. Some other sources are intuition, tenacity, rationalism, revelation, faith, empiricism and science. In this section, we discuss how knowledge is acquired.

1.5.1 Knowledge through Intuition

Intuition is a certain kind of experience when a conviction of certainty comes upon us quite suddenly like a flash. Here also we should exercise certain precautions. Intuitions can sometimes be conflicting. For example, two people can have different intuitions about tomorrow’s weather. How do we decide which one is true in that case? One can intuit that tomorrow will be a rainy day whereas the other can intuit that tomorrow will be a sunny day. In this case, it is always difficult to accept any one’s intuition. This can only be accepted through experience. Again, knowing through intuition does not really explain ‘Knowing how’. It does not explain about the validating procedure.

Many a times intuitive knowledge is later on validated as truth. For example, scientific investigation (Archimedes principle), which was an intuition was validated as truth later on. Thus intuition is a way to acquire knowledge.

1.5.2 Knowledge through Authority

We know that home, school, and community are the agencies of education. From the very beginning, children acquire various knowledge from home, school as well as from the community. Whatever they listen from their parents, elders at home, teachers/principals, religious and social leaders are knowledge for them. We can say that the authority with whom the children come in contact becomes the source of knowledge. But certain precautions are required in case of getting knowledge from the authority. The person from whom we acquire knowledge must really be an authority or is a specialist in his/her field of knowledge. Again, there must be validation mechanisms available to validate the knowledge received from the source of authority. These precautions should be taken care of.

1.5.3 Knowledge through Tenacity

Tenacity is something, which psychologically force the people to accept it. You must have observed the slogans of various political parties, advertisement of different commercial products, and repetitive propaganda for something. When such things are repeated many times in media such as in newspapers, televisions, or even in rallies, people believe them to be true. But the problem with getting knowledge through tenacity is that we do not know the claim made is true or not, and we also do not know when the knowledge received can be validated. This is a problem with knowledge acquired through tenacity.

1.5.4 Knowledge through Reason

Knowledge through reason can only be acquired through two ways: inductive reasoning and deductive reasoning. In both types of reasoning, knowledge is acquired through arguments and logic. In deductive argument, the conclusion
Understanding Knowledge and Disciplines

logically follows from the premises. If the premises are true, the conclusion that follows must be true. For example:

a) If it is raining, the streets are wet.
   It is raining.
   Therefore, the streets will be wet.

b) Men are mortal.
   He is a man.
   Therefore, he is mortal.

In inductive reasoning, the premises provide evidences for the conclusion. For example:

Iron conducts heat and electricity.
Copper conducts heat and electricity. Aluminium conducts heat and electricity.
(and so on for all metals).
Therefore, all metals conduct heat and electricity.

In this case, the fact is true in terms of inductive reasoning, but it may be false also. There may be metal, which does not conduct heat and electricity. Therefore, we acquire knowledge through deductive and inductive reasoning.

1.5.5 Knowledge through Empiricism

The process of acquiring knowledge through observation and experiences is called empiricism. The knowledge that we gain through scientific experiment, validating, re-validating, testing etc. are based on the empirical knowledge. Empirical knowledge is acquired scientifically through systematic methods of scientific inquiry. Again the knowledge that we acquire through sensory processes like seeing, hearing, tasting, smelling, and touching, etc. are the examples of knowledge through empiricism. Empirical knowledge is the best knowledge which can be tested, verified, observed, experimented, and also can be experienced. The conditions underlying here is that the process of validation needs to be objective and systematic. If there is error in investigation, the validation of knowledge may not be possible.

1.5.6 Knowledge through Revelation

Revelation has the same problem as intuition. Sometimes one claims to know something by means of revelation. For example, ‘it was revealed to me in a dream’. What if one person had a vision that told him the opposite? The fact, that the person had a dream or a vision, does not show that its message is true or can be validated. If what it says is true, its truth can be discovered only by other means.

1.5.7 Knowledge through Faith

Our belief and faith sometimes become the base for acquiring knowledge. Very often we say that, ‘I believe in it, it will work’, ‘I know this through faith’, ‘I have faith in it, so it must be true’, and ‘I believe it through faith, and this faith gives me knowledge’. Just like intuition, the same difficulty also arise here. People have faith in different things and the things they claim to know by means of faith often conflict with one another. Faith is a firm belief in something for which there is no evidence. So it cannot be a valid source of knowledge.
1.6 CATEGORISATION OF KNOWLEDGE

Knowledge is the sum total of human beings’ interaction with the environment, social conditions where they live and also interactions with themselves. It is, therefore, said that knowledge cannot be unified or grouped in one category. Different approaches to classification of knowledge suggest different aspects of the process of knowledge acquisition and their significance to the curriculum planner. These classifications and categorisations have been characterized differently by various philosophers as ‘disciplines’, ‘forms of knowledge’, ‘realms of meaning’ and so on.

‘Knowledge’ is used in a variety of ways and this suggests that knowledge may be of different types. There are three types of knowledge:

(a) Propositional Knowledge (‘knowledge that’ or ‘knowledge of what’ is expressed in true statements)

(b) Procedural Knowledge (knowledge ‘how’ or knowledge of how to do things)

(c) Direct Knowledge (knowledge of persons, one’s own mental states)

Propositional knowledge is ‘Knowledge that’ or ‘knowledge of what’ is expressed in true statements. It is not all of one logical type knowledge, no one would
seriously dispute, but the actual number of such logically different knowledge ‘forms’ is still a contentious issue. Let us consider, for illustration purpose, the propositions of Mathematics and Physical Science. A proposition can be looked at in two ways, from the point of view of whether it contains any factual content and from the standpoint of criteria employed for deciding its truth or falsity. In the first class, we have propositions like, ‘sodium chloride dissolves in water’ which gives us factual information (synthetic propositions) and also those like ‘bachelors are unmarried people’ that simply analyse the meaning of the words used (analytic propositions). From the standpoint of criteria, we have propositions whose truth can be decided only with reference to observation and verification of facts (a posteriori proposition) and those whose truth or falsity can be decided by pure reason without recourse to verification with experience (a priori propositions). It can be clearly demonstrated that Mathematical knowledge is of the analytic or a priori type; and scientific knowledge is of the synthetic or posterior type.

Encouraged by this clear-cut logical distinction between propositions of Science and Mathematics, and its consequences for teaching and curriculum, several philosophers of education have addressed themselves to the questions of identification of the different forms of knowledge and designing a curriculum on the basis of these. One of the most influential theories in this regard has been put forward by the Cambridge Professor of Education, Paul H. Hirst (1974).

Hirst’s (1974) thesis is that the domain of human knowledge can be differentiated into a number of logically distinct ‘forms’ none of which is ultimately reducible in character to any of the others, either single or combination. According to him, there are seven such forms:

- Formal Logic and Mathematics
- Physical Sciences
- Human Sciences, which includes:
  - History
  - Moral understanding
  - Religious knowledge
  - Philosophy
  - Aesthetic

The features that distinguish these different forms are:

1) They involve certain central concepts that are peculiar to the form. There are different types of concepts that characterize different forms of knowledge.

2) They have distinctive logical structures. The concept occurs within different networks, where relationships determine what meaningful propositions can be made.

3) They have distinctive criteria for truth in terms of which their propositions are tested.

4) They have developed particular techniques and skills for production of true propositions.

On the basis of the above, different knowledge can be combined/categorised for creating a substantial body of knowledge of the same form and which later helps to constitute a discipline. As like, we can exemplify as follows:
Table 1.1 : Categorisation of Knowledge for Constituting a Discipline

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<thead>
<tr>
<th>Categorisation of Knowledge and its processes</th>
<th>Constituting a Discipline</th>
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<tbody>
<tr>
<td>Observation, inquiry, experimentation, scientific discovery, scientific exploration, scientific innovations, personal experiences, intuition, empiricism, rationalisation, etc.</td>
<td>Broad discipline of Science</td>
</tr>
<tr>
<td>Problem solving, analytical and synthetic thinking, logical reasoning, inductive and deductive thinking, etc.</td>
<td>Discipline of Mathematics</td>
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<tr>
<td>Observation, social inquiry, historical discovery, social exploration, social innovations, narratives, socio-personal experiences, etc.</td>
<td>Broad discipline of Social Sciences</td>
</tr>
<tr>
<td>Thinking, creating, narrating, appreciating, reflecting, realising, etc.</td>
<td>Discipline of Humanities</td>
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We will discuss more details about the forms of knowledge and constitution of discipline at the next section of this Unit.

**Activity 1**

Discuss with at least one example of the form of knowledge from each discipline.

**Science:** ..........................................................
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**Social Science:** ..........................................................
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**Mathematics:** ..........................................................
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**Humanity:** ..........................................................
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Knowledge and Disciplines
1.7 CONSTITUTION OF DISCIPLINARY KNOWLEDGE

We often use the concepts such as discipline, disciplinary knowledge, academic discipline, etc. during our academic deliberations. We need to understand carefully, what does a discipline mean? How did disciplinary knowledge evolve? In this section, firstly we will try to understand the concept of ‘discipline’ and next we will proceed to examine the process of construction of disciplinary knowledge. We will further elaborate on disciplinary knowledge in Unit-2 of this Block.

1.7.1 What is a Discipline?

An academic investigation of the concept of ‘disciplinarity’ starts off with an exploration of the etymology of the term ‘discipline’. The term ‘discipline’ originates from the Latin word ‘discipulus’- which means pupil, and ‘disciplina’ - which means teaching (noun). As a verb it means training someone to follow a rigorous set of instructions, but also enforcing obedience (Krishnan, 2009).

A discipline is an organised body of knowledge with a logical structure. It is a network of concepts and generalisations which explain the relationships among a body of facts. We learn by seeing relationships among different events and processes, and by generalizing about them. We see relationships among different facts and events with the aid of concepts and conceptualize by classifying them. We link concepts belonging to a class together and form conceptual structure of the concepts. It is these conceptual structures that constitute disciplines. A discipline is an organised body of knowledge, characterized by a domain, a method, and a tradition.

Academic discipline has been seen as a form of specific and rigorous scientific learning that will turn out practitioners who have been ‘disciplined by their discipline’ for their own good. In addition, ‘discipline’ also means policing certain behaviours or ways of thinking. However Michel Foucault (1991) has famously interpreted ‘discipline’ as a violent political force and practice that is brought to bear on individuals for producing ‘docile bodies’ and minds. Foucault uses the term ‘discipline’ in a very general and also fairly specific sense; it clearly includes the academic disciplines and their contributions to bringing about ‘discipline’ in society.

The term ‘academic discipline’ certainly incorporates many elements of the meaning of ‘discipline’ discussed above. At the same time, it has also become a technical term for the organisation of learning and the systematic production of new knowledge. Often disciplines are identified with subjects taught in universities, but clearly not every subject taught at university can also be called a discipline. There is more to disciplines than the fact that something is a subject taught in an academic setting. In fact, there is a whole list of criteria and characteristics, which indicate whether a subject is a distinct discipline or not.

1.7.2 Characteristics of a Discipline

The characteristics of a discipline are the following:

- Every discipline has a history. It implies the development of that particular discipline and the chronology of its growth and modification.
- Each discipline has certain domain of knowledge (cognitive, affective and psychomotor).
- Discipline has a particular object of research, though the object of research may be shared with another discipline.
- Discipline has a substantial body of knowledge and research, which is specific to it and not generally shared with another discipline.
- Discipline has theories and concepts that organise the accumulated knowledge effectively.
- Discipline uses specific terminologies or a specific technical language to define and explain the concepts and facts included in that discipline.
- Discipline has developed specific research methods according to its specific research requirements.
- Discipline must have some institutional manifestation in the form of subjects taught at universities or colleges, respective academic departments and professional associations connected to it.
- A discipline has a group of intellectual followers, who have strong belief in that discipline. They conduct new researches in that discipline, and bring changes in that discipline with new facts and innovations.

In short, a discipline must have a body of accumulated knowledge which is specific to that discipline and not generally shared with another discipline. But in many cases, many forms of knowledge keep overlapping across the disciplines; like Science and Mathematics; and even Science and Social Sciences. Also, a discipline must have theories and concepts that can organise the accumulated knowledge effectively and use specific terminologies or a specific language to explain its disciplinary body of knowledge. A discipline must have some institutional manifestation in the form of a specified body of knowledge.

**Activity 2**
You as a teacher, highlight at least five characteristics of a discipline that you have studied.

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1.7.3 What Constitutes a Discipline?

We discussed in the previous section that a discipline has its own characteristics. It has a substantial body of knowledge, based upon which researches are conducted. A discipline is always dynamic in nature. The followers of a discipline conduct research and further develop that discipline from time to time. Very often, there are examples of emergence of many new disciplines from the parent discipline like; ‘Nano Technology’ from the discipline of ‘Physics’, ‘Microbiology’ from the discipline of ‘Biology’, ‘Biochemistry’ from the discipline of ‘Chemistry’ etc. A discipline has also philosophical, historical and political bases/perspectives. A
discipline has a domain of knowledge. In this section, we will discuss more on the distinctive features of a discipline and its constitution.

A discipline is characterized by its structure which includes domain, method and history.

- First, it has a domain, a field of phenomena (subject matter), with which it deals. This may refer to different aspects of reality – scientific, logical (Science and Mathematics) or with different degrees of overlapping between them.

- Second, every discipline has its own methods and modes of inquiry and also a set of rules to validate the knowledge. The use of methods again implies the form/type of knowledge it deals with. The rules of one discipline cannot be applied to other, but similar practices of methods in different contexts can be used across the disciplines.

- Third, a discipline has its own history which describes its domain of knowledge, rules and philosophy.

The detailed explanation of a structure of a discipline is as follows:

As mentioned earlier, each discipline has a domain. Not only has every discipline a domain, but every theory within a discipline has also a domain, upon which the intellectual operations of the researchers are carried out. For example, the biological theories are concerned with the organisation and movement of matter in living systems. ‘Knowledge’ may be regarded as the set of assertions or verifiable truth-claims which researchers in the discipline have cumulatively built up for the domain. The followers of the discipline operate upon the domain by means of a substantive structure and a syntactical structure.

The substantive structure of a discipline is the interrelated connection of powerful ideas that guide research in a discipline.

The syntactical structure of a discipline is concerned with issues such as the way in which new substantive concepts are formed and the ways in which different kinds of knowledge statements are generated. In short, it is concerned with the methods of thinking and reasoning used in the discipline.

Knowledge is also the product of a social structure. Though the believers of a discipline individually conduct research and theorise ideas in that discipline, but still it is the function of the group of scientists / social scientists to critically assess and validate the ideas by using scientific or social inquiries/observation and decide whether or not to incorporate them into a discipline.

In short, discipline involves groups of creative people who interact among themselves for the growth of the discipline. Disciplines are not simply the products of rational machines. The production of knowledge within a discipline has psychological, sociological as well as logical bases.

1.7.4 Forms of Disciplines

Disciplines can be classified into the following broad categories:

**Basic Discipline:**

Some disciplines have their own networks of concepts which are distinctive and unique in nature. Such disciplines are categorised as ‘Basic Disciplines’. Thus have their own logical structure of knowledge. For example, Mathematics is a
basic discipline which has distinct and abstract concepts and the criterion of testing truth in Mathematics is deductibility within an axiom system.

The discipline of ‘Science’ consists of its own concepts, facts, principles, generalizations, laws and theories which are empirical in nature. Observation is employed as the criterion for verification of knowledge. Science is an organised body of knowledge that deals with nature and nature’s law. This body of knowledge has been divided into various science disciplines with more specialised characteristics like ‘Physics’, ‘Chemistry’, and ‘Biology’.

Social Sciences, include awareness and understanding of our own and others minds, and include concepts that are essential for interpersonal relationships. The Social Sciences are divided into ‘Sociology’, ‘History’, ‘Anthropology’, ‘Political Science’, ‘Psychology’ and so on.

**Applied Disciplines or Fields:**

The applied disciplines are those wherein the knowledge of basic disciplines are used. For example, scientific knowledge is used in technological applications. The areas of Bio-engineering, Biotechnology, Applied Physics, Environmental Biology are some of the examples of applied disciplines.

As knowledge advances, new areas of knowledge and disciplines emerge new specialisations are created having their roots in basic disciplines and merge with other relevant areas.

**Multidisciplinary and Interdisciplinary Areas:**

The recent approaches to designing the curriculum in schools are inter, multi or trans-disciplinary. For example, ‘Economics’ is not studied independently. The knowledge of the disciplines of other branches of Social Sciences like; ‘History’, Political Science’, ‘Geography’, and ‘Sociology’ are integrated into designing and transecting Economics in a better way. This is an interdisciplinary approach in which one discipline serves as the principal organiser, with related disciplines serving supplementing to the principal organiser.

Multidisciplinary approach concepts are selected from various disciplines to create a new field of study. For example, the area of Population Education requires the use of Biology, Economics, Psychology, Sociology, Geography and so on. There are many other areas, which are multi-disciplinary in nature like Home Economics, Social Biology, etc.

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**Check Your Progress 4**

**Notes:**

a) Write your answer in the space given below.

b) Compare your answers with the ones that are given at the end of the unit.

7. Define discipline.

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8. What constitutes a discipline?

9. Explain the characteristics of a discipline.

10. What is a basic discipline?

1.8 IMPLICATIONS OF KNOWLEDGE FOR TEACHING AND LEARNING

Mostly all educational institutions and schools are engaged in the transaction of knowledge among students. As stated earlier, the question of knowledge brings in its terrain a host of other contentious issues.

What is the nature of knowledge?
How is it acquired?
What are its sources?
How do we judge the validity of knowledge?

These are questions which have evoked multiple responses from the people concerned (Jha, 2005). Understanding these questions about knowledge helps a teacher how to choose appropriate contents to be taught to the students and how to organize learning activities so that students can not only acquire knowledge but also become able to construct knowledge in respective field of study. It helps to know ‘learning about learning’, ‘knowing about knowing’ and ‘thinking about thinking’ (meta-cognitive ability) around which all teaching and learning practices revolve.

In other words, we can say that, deeper understanding of knowledge can help teachers organise teaching and learning from the disciplinary point of view. A sensible and committed Mathematics teacher would like to ask himself or herself questions like:
What is the nature of Mathematical knowledge?
How is Mathematical knowledge acquired?
What are the sources of Mathematical knowledge?
How do we judge the validity of Mathematical knowledge?

These are questions which will certainly help a Mathematics teacher to make his/her teaching logical based on reasoning, and consequently he or she would like to use such pedagogic strategies which are not only exciting but also truly constructive. This process of understanding knowledge of a particular subject and its transactional aspect is not only applicable to the discipline of Mathematics only, it can also be applicable to other disciplines. Accordingly, the knowledge of the disciplines of Social Sciences, Humanities, etc. requires appropriate pedagogies for organising teaching-learning activities in the schools.

**Activity 3**

Relating to your discipline of study and teaching at school, suggest sources and ways of acquiring knowledge in that discipline and pedagogies for effective transaction of learning experiences.

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1.9 LET US SUM UP

Understanding knowledge helps a teacher how to choose appropriate contents to be taught to the students and organize learning activities so that they can not only acquire knowledge but also construct knowledge in respective field of study. It helps to know ‘learning about learning’, ‘knowing about knowing’ and ‘thinking about thinking’ around which all teaching and learning practices are organized. In other words, we can say that deeper understanding of knowledge can help teacher organize teaching and learning activities from the disciplinary point of view.

In this Unit, we discussed the concept of knowledge and the sources and ways of acquiring knowledge. This Unit further elaborated the categorization of knowledge which helps to constitute a discipline. We explained the basic characteristics of a discipline. The Unit also acquainted you with the typology of knowledge or discipline. Finally, the Unit ended with a discussion on implications of knowledge for the teaching-learning process.
1.10 REFERENCES AND SUGGESTED READINGS


Kuhn, T. (1962). The structure of scientific revolution, Chicago: The University of Chicago

1.11 ANSWERS TO CHECK YOUR PROGRESS

1. A priori knowledge is knowledge whose truth or falsity can be decided before or without recourse to experience (a priori means ‘before’). A posteriori knowledge is the knowledge based upon observation and experience. This is the knowledge of the scientific method stressing accurate observation and exact descriptions.

2. Experienced knowledge is always tentative and cannot exist prior to experience or be conducted from observation. It must be experienced to have value. Put example of your own.

3. Information is the interpretation of data with certain context and relevance. Knowledge is information which has been cognitively processed and integrated into an existing human knowledge structure. Put example of your own.

4. Intuitive knowledge is a label for a certain kind of experience when a conviction of certainty comes upon us quite suddenly like a flash. Put example of your own.
5. Knowledge through rationalism can only be done through two ways: inductive reasoning and deductive reasoning. In both types of reasoning the knowledge is validated through arguments and strong logic.

6. Knowledge gained through empiricism involves objective observation and experiences.

7. A discipline is an organised body of knowledge with a logical structure. It is a network of concepts and generalisations which explain the relationships among a body of facts.

8. A discipline is constituted with a substantial body of knowledge, a history of its development, a group of followers, and with certain forms of knowledge and approaches to its transaction.


10. Each discipline has its own networks of concepts which are distinctive and unique in nature. Such disciplines can be categorised as Basic Disciplines, which have their own logical structure of knowledge, like Mathematics, Science, Biology, Sociology etc.