

## STUDY SESSION 12

### THE CONCEPT AND NATURE OF PHILOSOPHY OF SCIENCE



#### 12.1 Introduction

This study session will introduce you to the concept and nature of philosophy of science. As such, our major concern here would be to understand the concept of science as understood by philosophers, calling to mind their various contributions to the development of the field of science and the philosophy of science. In this study session, we will be examining the concept of science and the philosophy of science. The study of the history of science and philosophy of science will also be a big discussion in this session as well as insights into the scientific culture and method. You will be able to understand reasons for the study of science through the lens of philosophy, hence the further analysis of the field of the philosophy of science.



#### 12.1.1 Learning Outcomes of Study Session 12

After you have studied this session, you should be able to:

1. Define science;
2. Define the philosophy of science;
3. Give a detailed account of the history of science; and
4. List and explain methods of scientific culture.

#### 12.2 What is Philosophy of Science?

Philosophy of science is a critical discussion of developments in science which takes account of how it (science) has fared throughout the ages, and how it has affected man's destiny positively or negatively. Philosophy of science is the exhibition of the workings of

philosophy in the scientific enterprise in the context of its history. It wants to be a radical departure from the common place presentation of history and philosophy of science in form of a discussion of scientific topics such as “measurement”, “velocity”, “electrons”, “protons”, “neutrons”, “asteroids”, *et cetera*. It claims that these topics are already exhaustively discussed in our faculties of science and need not engage the attention of a cerebral thinker in philosophy. While it acknowledges the importance of stimulating the interest of the young scholar in science, philosophical science insists that a philosophy worthy of the name need not be an emotionally overcharged errand boy of any discipline.

Some teachers of academic philosophy who want to go along with any discipline momentarily “making the waves” often cite scholasticism as a typical example of the task of philosophy in any era. They claim that as philosophy was the handmaiden of theology in the medieval period, so shall it be the handmaiden of science in our time. In truth, however, such a strategy of philosophy is to be deplored and it has been deplored. A philosophy that babysits the sciences or allows itself to be subservient to the disciplines reduces itself to the role of a second fiddle and in time consigns itself into the dustbin of obsolescence and irrelevance.

For philosophy to maintain its pride of place and be relevant in the realm of the sciences, it must make a clear statement and a significant contribution to the advancement of scientific knowledge. It has and it could still do so in a dignified manner. But philosophy cannot achieve this task by tying itself to the apron-string of any discipline. Philosophy cannot attain the status of intellectual aristocracy or “world citizenship” by merely playing a second fiddle. The intrusion of philosophy into the realm of science should be able to jolt science or put it constantly on the mettle, on its toes. Philosophy should detonate, if you like, explode a hand grenade or a napalm bomb under the scientist’s accustomed way of treating reality.

Philosophy should make science pulsate, bubble and come alive. Only then is the philosopher's projection into science authentically and radically philosophical.

It is to distinguish our task from those of our colleagues seeking relevance in the morass of the disciplines that we call our undertaking in this treatise a Philosophical Science. All this, in the last analysis, is to signal the reader that a more fruitful and exciting way of embarking on the study of History and Philosophy of Science exists, and it shall be elaborated on presently. Suffice it to state here that the task of Philosophical Science is to prod "scientists into an extremely healthy state of scepticism about many of the traditional foundations of their thinking"<sup>1</sup>.

### 12.2.1 In-Text Questions (ITQs)

For philosophy to maintain its pride of place and be relevant in the realm of the sciences, what must it do?

### 12.2.2 In-Text Answers (ITAs)

Philosophy must make a clear statement and a significant contribution to the advancement of scientific knowledge.

## 12.3 Nature of Philosophy of Science

Certain basic characteristics clearly distinguish scientific knowledge from other sorts of knowledge, and they include, among others, the following.

### Observation of Facts

Apart from Mathematics, and depending on the knowledge situation, most of the disciplines classified under physical and natural science begin with the observation of facts, that is, how

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<sup>1</sup> E.A Burt, *The Metaphysical Foundation of Modern Science*, (New Jersey: The Humanities Press, 1980)

things generally behave. Galileo was the first in the history of science to start studying or observing the “behaviour of falling bodies”<sup>2</sup>. From this observation or study, more facts were collected about moving bodies which refuted earlier theories of motion such as that of Aristotle which asserted that “the rate of fall was proportional to the weight of the body” in question. Thus, progress in science has been largely assured by the observation of things as regards how they, as a rule, behave<sup>3</sup>.

### **Collection of Data**

It is often suspected and contended that the way things are observed to behave may actually be different from how they truly behave. This makes collection of facts for close scrutiny another important feature of science. Facts or data are collected for the purpose of laboratory analysis and verification.

### **Experimentation**

Through laboratory analysis and experimentation of collected data the essential characteristics of things are determined. Since it is necessary to determine the actual composition and status of things, laboratory experiments, especially in the natural sciences, constitute one basic way of recognizing a genuine work of science.

Furthermore, a genuine work of science is characterized by the formulation and testing of hypothesis, the construction of theories and the establishment of a causal law or probable laws governing a number of particular facts. We should, perhaps, state here that there is no hard and fast rule as to whether observation or hypothesis or theory comes first before the others. Another recognizable feature of a work of science is that its claims or assertions are veridical, that is, they are capable of being shown to be true or false. The results arrived at must be repeatable, and findings should make predictions possible.

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<sup>2</sup> Friday N. Ndubuisi, *Contextual issues in Scientific Philosophy*, (Lagos: Panaf Press, 1997), p.13

<sup>3</sup> Martin Heidegger, “the Age of the World Picture” in Alfred I. Tauber (ed.), *Science and the Quest for Reality: Main Trends of the Modern World*, (London: Macmillan Press Ltd., 1997), 74

## Research

As we have said in the foregoing discussion, science is organized research. In other words, research is the essence, if you like, the kernel of science. But what is research? Research is “ongoing activity” situated on a ground plan projected into an object sphere<sup>4</sup>. The basic event in research, the essence of research, is the opening up of this object sphere in which continuous, ongoing, activity is carried out. And needless to say, research exacts rigour from those who take part in it. Consequently, every form of research exacts rigour, be it those of the mathematical, physical and natural sciences or those of the social and humanistic disciplines. Rigour means the “obligation to remain within the sphere opened up”<sup>5</sup>. Rigour is tenaciously remaining on course, in focus. Thus, research achieves its objective of eliciting the truth of what is, through rigour. Rigour enables research to emerge with a strict opinion on what is. And since research as continuous interrogation or “ongoing activity” is the essence of science, the decision regarding the essence of truth by science is the product of rigour. Thus, rigour is research and any research which proceeds “from observation of particular facts to the establishment of exact quantitative laws, by means of which future particular facts could be predicted”<sup>6</sup> is science, expressed in simple terms.

### 12.3.1 In-Text Questions (ITQs)

List three basic characteristics that distinguish scientific knowledge from other sorts of knowledge.

### 12.3.2 In-Text Answers (ITAs)

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<sup>4</sup> *Ibid*, p.73

<sup>5</sup> *Ibid*, p.87

<sup>6</sup> Bertrand Russell, *Op.cit*, p.21

Experimentation, Collection of data and Observation of facts

#### 12.4 What Is Science?

The simple way to look at science is to see it as the devotion of man to research or the attainment of the kind of knowledge which establishes general laws governing a number of particular, isolated facts. This devotion to research or knowledge of general laws connecting facts of particular sorts has increased man's power and technique of controlling and manipulating nature<sup>7</sup>. Thus, science as a culture of research is intertwined with the increased power and technique of controlling and manipulating nature. Others have described science as "...trained and organized commonsense", the "critical and accurate observation and description of things and events"<sup>8</sup>.

We could also define science as the product of curiosity – the urge to know. It seeks for evidence and deals with facts, that is, "with what is true or false". In its strict or pure form, science is the "quantitative and objective knowledge of nature". Science is knowledge for its own sake without due regard for practical consequences. Science is strict official position constructed on facts or evidence. It is strict adherence to or insistence on rules without recourse to sentiments or extraneous considerations. Science is officialdom.

Thus, in this study, we mean by science, those disciplines of a mathematical, physical, chemical and natural sorts which make claim to exactness, objectivity, universality and methodological orthodoxy. They include, among others, the disciplines of Mathematics, Physics, Chemistry, Astronomy, Biology, *et cetera*. The Social Sciences would not come up for inclusion in this body of knowledge that demands rigour and exactness. It is only in a broad sense that the Social Sciences qualify for inclusion in the scientific enterprise, since

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<sup>7</sup> Ibid

<sup>8</sup>Timon H. Harold & M.S Smith, *Living Issues in Philosophy, Sixth Edition*, (New York; D. Van Nostrand Company, 1994), pp.284 - 285

they also purport to deal with facts which can be true or false. What distinguish the former from the latter sort of Science is “rigour”, laboratory experimentation and “exactness”. Although it could be demonstrated that not all the disciplines of the mathematical, physical and natural types have the same strictness, exactness and rigour and not all of them submit themselves to laboratory experimentation, they are the ones referred to, primarily and mainly, when we speak of Philosophical Science or History and Philosophy of Science. Thus, by science, in our context of discourse, we mean natural science. The social sciences are excluded here, but they are ripe for attention in another treatise.

#### 12.4.1 In-Text Questions (ITQs)

What distinguishes the pure science from social science?

#### 12.4.2 In-Text Answers (ITAs)

Rigour.

### 12.5 Why Study the History and Philosophy of Science?

We walk into the mainstream of this study by seeking an answer to the question, “why is it necessary to gain an insight into the *History and Philosophy of Science*?” Look at it this way. Science as a culture of research has increased man’s power and technique of manipulating and controlling nature<sup>9</sup>. That power and technique which arose from science have, today, become our passion. Why not? Science has produced immense and dazzling results. People now think, talk and fictionize science. Almost everyone is fascinated by the scientific way of doing things – the scientific way of investigation and the scientific way of life. What is stated shows that we are now neck-deep in a science culture. Needless to say, the story of a culture that, literally, has become the concern of everyone needs to be told.

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<sup>9</sup> Bertrand Russell, *The Scientific Outlook*, (New York: W.W Norton and Company Inc., 1962), p.viii

Another point of interest in studying the history and philosophy of science is that every normal human being would want to identify with success. The story of science has, by and large, been that of success. People are always enthused by stories of success – when things happened and how they came to be – in order that they may take advantage of the opportunities offered by the situation.

It is therefore important to study the history and philosophy of science so that we can acquaint ourselves with developments in the enterprise with a view to availing ourselves of the opportunities offered by the scientific outlook.

In addition, an understanding of the History and Philosophy of science would enable us to take active interest in it and develop the discipline and thought habits necessary for the emergence of a science culture in our environment. It is only when we have adequate understanding of when and how something came about and what it promises could we purposively partake of it.

In like manner, everywhere in the world, organizations, be they governmental or non-governmental, as well as big financiers of research projects and programmes normally do want to be apprised of developments in a field before they could be persuaded to commit their resources.

It is envisaged, therefore, that a well-articulated history and philosophy of science which projects the progress it (science) has made throughout the ages, and how its application has alleviated human plight and improved the standards of man's daily transactions in practically every sphere of life would encourage governments and non-governmental organizations in developing nations to invest enormous resources in the scientific enterprise.

### 12.5.1 In-Text Questions (ITQs)

According to this session, when do we purposively partake of something?



### 12.5.2 In-Text Answers (ITAs)

It is only when we have adequate understanding of when and how something came about and what it promises.

## 12.6 The Science Culture and Method

Unfortunately, the mere desire for a science culture does not in itself produce scientific activities. What produces scientific activities is, primarily and mainly, a hunch, that is, the feeling (upon observation of facts) that something might be the case. Once the hunch is there, you become curious about things. It is this curiosity arising from a hunch that gives impetus to scientific activities. Thus, the first condition for the emergence of scientific activities is that there are human beings who are actuated by the urge to know.

Nevertheless, the urge to know, without any further ado, cannot by itself establish a science culture. Ingrained in the urge to know is the desire and willingness to dedicate oneself to research which, we have said, is the essence of science. Research construed as ongoing inquiry demands commitment and exacts rigour. You need men and women with intellectual stamina and a capacity to remain on course to set in motion and sustain scientific activities.

Apart from men and women of calibre, there are other thought habits and a form of discipline necessary for the emergence of a science culture. People who desire science should not pay lip service to it. People should cultivate the habit of seeking for evidence, for facts, and rigorously applying the logic of facts. A people who prefer hearsay and rumour to facts or evidence cannot develop a genuine science culture.

You need, also, for the emergence of a scientific way of life a conducive social and political climate. You need a social and political environment that ensures continuity and consistency of policy positions such that research proposals are not tied to the vagaries of changing political fortunes, whims, and caprices of those who exercise the powers of the state. The

evident lack of a conducive, social and political climate accounts for the inability of developing nations and societies, under the yoke of oppressive social regimes, to develop a science culture in their environment.

It is for this reason that a strong argument has been advanced in favour of having the humanities and the social sciences, especially those that extol emancipatory, liberatory and democratic values and virtues, develop side by side with the mathematical, physical and natural sciences. Sandra Harding thinks that we would have to reinvent science (of the latter sort) in order to make sense of our social experience<sup>10</sup>. Similarly, it has been argued that scientific rationality or the scientific outlook requires an understanding of how our value, social and political commitments insert themselves into our research methodologies<sup>11</sup>. The point of interest here is that “science and knowledge will always be deeply permeated by value commitments and the social relations through which they come into existence...”<sup>12</sup>. The summary of all this is that a science culture requires for its sustenance an adequate knowledge of the role of value orientation and social relations in our research efforts.

We return now to the crucial segment of this introductory essay which we highlighted in the preliminary remarks. It is the question of what precisely it is that makes science philosophical. What are those elements of a philosophical nature that make incursions into science? What makes science truly, authentically and radically philosophical?

### 12.6.1 In-Text Questions (ITQs)

What produces scientific activities is, primarily and mainly\_\_\_\_\_

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<sup>10</sup> Sandra Harding, *The Science of Questions in Feminism* (Ithaca New York: Cornell University Press, 1986), p.251

<sup>11</sup> P. Lather, “Feminist perspectives in Empowering Research Methodologies” in *Women Studies International Forum*, Vol.II, No.6, 1988, p.576

<sup>12</sup> Sandra Harding, *Whose science? Whose knowledge? Thinking from Women’s Lives*, (Ithaca New York: Cornell University Press, 1991), p.ix

## 12.6.2 In-Text Answers (ITAs)

A hunch, the feeling that something might be the case

### 12.7 What It Means for Science to Be Philosophical

Philosophical science or rather philosophy of science has been presented in many different ways, three of which are easily distinguishable. It is increasingly becoming suspect by the day whether all of them can pass muster. What cannot be disputed in the various presentations is that philosophy of science is an attempt to render science accessible and to make it an object for philosophical scrutiny. Whether the scrutiny, in all cases, is properly executed or whether it is actually philosophical remains to be seen. We begin our task by examining three distinguishable methods of presenting philosophy of science namely, the pedestrian “anything goes” method, the critical method and the original philosophical method.

**1. The Pedestrian Method.** This method of presenting the philosophy of science takes the form of the discussion of topics in science such as measurement, motion, electro-magnetic waves, electrons, neutrons, protons, celestial bodies, *et cetera*. In some cases, the activities of notable persons in science or in philosophy are discussed in relation to major discoveries in science without discussing or clearly showing what is philosophical in such activities and discoveries. Often times, you take up a philosophy of science text and find discussions of how it was discovered that “light travels on a straight line”, how falling bodies generally behave; or how Copernicus and Kepler have impacted on astronomy, how Newtonian Physics amounted to a breaking of new grounds, how Euclidean geometry is different from non-Euclidean geometry, without a hint as to how these scientific exploits generated philosophical problems and discussions or how epistemological debates in philosophy have acted as a catalyst for such scientific activities and discoveries.

Presented in this manner, philosophy of science is threadbare, barren, pedestrian. It makes the enterprise an all-comers affair. Anyone who is literate in the language of instruction would be competent to dispense this body of knowledge. In other words, this pedestrian method of presenting the philosophy of science makes the argument robust that a trained scientist or historian or linguist or even an accountant is competent to teach philosophy of science.

The robustness of the contention that just anyone can teach philosophy of science is aided and abetted by the “anything goes” attitude of some teachers of academic philosophy who subscribe to the convenient view that philosophy is a huge umbrella which provides shelter for virtually all theoretical activities. Unfortunately, such a conception of philosophy can no longer hold after centuries of the dismemberment of philosophy into independent disciplines, each with an object sphere of its own. What this means is that man has introduced division of labour and specialization of functions in his activities, be they theoretical or practical. In such a state of affair, we cannot continue to entertain the “anything goes” attitude to philosophy without absurdity.

Fortunately, the division of philosophy into independent disciplines leaves philosophy with exclusive items which constitute its functions. It is these items that it (philosophy) projects into any discipline, anything, that it seeks to investigate. Without such a projection of the exclusive philosophical items into anything, into any discipline, the endeavour would not be philosophical. Consequently, the pedestrian presentation of philosophy of science under examination in this segment does not pass muster. This takes us to yet another method of presenting philosophy of science – the critical method.

**2. The Critical Method** of doing philosophy of science entails taking up science and examining its fundamental assumptions and presuppositions,<sup>13</sup> its competing theories, its methods of inquiry and its relation or non-relation to other fields of study. An activity of this

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<sup>13</sup> C.S Nwodo, “ A Critique of Copelston’s objection to Philosophy of History” in *The Nigerian journal of philosophy* Vol.2 No.1 & 2, 1989, p.71

sort is often described as *meta science* or *meta scientific* inquiries of the methodology of science. Surely, it is part of the functions of philosophy to inquire into any discipline, into anything, to establish its mode of cognition, its foundation and its limitations. The critical question concerning the procedure of human reason in scientific research, for example, is not science but meta-science, and as such qualifies to be called philosophical.

The point of interest here is that criticism of method and procedure and the clarification of concepts are some of the attributes native to philosophy. And so, the criticism of scientific methodology and procedure and the clarification of scientific terms would constitute a philosophy of science. But we must quickly point out that this method of presenting philosophy of science, that is, the method of critical discussion of basic assumptions and presuppositions of science as well as a critique of its methodology of inquiry are not the sort of things that only a trained philosopher can do. A working scientist, at some point, would be compelled to critique his method and basic assumptions. This makes philosophy of science an enterprise that is open to two sorts of people – the trained philosopher and the trained scientist.

Arguably, criticism of method, procedure and fundamental assumptions and presuppositions of any discipline as well as the clarification of concepts therein are functions of philosophy, especially where there is division of labour and specialization of functions. Criticism of method, procedure and basic assumptions and the clarification of terms or concepts are like a tool sharpening exercise. By critical discourse philosophy sharpens the methodology and concepts of science or any discipline whatsoever. But the claim of the trained scientist to the enterprise of philosophy of science is that if the philosopher does not do it, the scientist would himself perform the function in course of time, since tools invariably become blunt and would require sharpening.

Strictly speaking, it is not the job of the scientist as scientist to sharpen his tool, especially where we have traditional and professional tool sharpeners. By embarking on the criticism of his method, procedure and basic assumptions and presuppositions the scientist abandons his primary assignment to the territory of the philosopher<sup>14</sup>. Thus, when we insist on division of labour and specialization of functions, philosophy of science presented as a meta scientific inquires of the methodology, procedure, basic assumptions and presuppositions of science or the clarification of scientific terms, is the legitimate function of philosophy. The only argument in favour of the scientist is that if there is a need to prune down expenditure and reduce the national workforce to the barest minimum in times of economic recession, and if the argument is whether to retain the philosopher or the scientist, the latter (the trained scientist) would have an upper hand since he can combine two functions; for the scientist can double as a field researcher (which he is trained for) and a critic of method (which is the philosopher's task).

What this means is that if all the philosopher does in philosophy of science is criticism of method, procedure, basic assumptions and presuppositions of science and the clarification of its terms, then, he is threatened in the event of rationalization of courses in our universities, especially in the decision as to who should teach the history and philosophy of science.

There is, however, a fundamental problem in the scientist combining his function as researcher with those of the philosopher as critic, guide and guard. First, the ambitious scientist usurps the role of the philosopher when the latter is available, able and willing to perform, and ends up painting philosophy with the brush of his discipline. Second, the combination of two functions by the scientists transgresses the norms of division of labour and specialization of functions so vital for the assurance of efficiency in human transactions. Experience shows that trained scientists – mathematicians, biologists, chemists, physicists, *et*

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<sup>14</sup> Jim I. Unah, "Metaphysics as the Foundation of Knowledge" in *Metaphysics, Phenomenology and African Philosophy*, (Ibadan: Hope publications, 1996), p.5

*cetera*, who abandoned research and laboratory experiments to deal with the philosophical problems of method and basic assumptions never returned to their primary duty posts. For, as soon as they enter the exciting philosophical arena of controversy over the meaning of concepts and limitations of methods, they never remember to return to the laboratory, thereby depriving humankind of the benefit of their fact-finding assignment. Rene Weber<sup>15</sup> makes this crucial point in her *Dialogues with Scientists and Sages*. The philosopher's world is so rich, so exciting and so aristocratic to warrant a return to the scientists' drudgery.

Fortunately, there are exclusive philosophical products or manufactures of pure reason which are exported to the realm of science to guide and guard science. Such exclusive philosophical items which are injected into science make the philosopher indispensable in the realm of science. Absence of such exclusive philosophical items not only makes science threadbare and being-less, it makes the scientific enterprise socially and politically very dangerous. An elaboration of this will be undertaken in our treatment of the original philosophical method of presenting philosophy of science.

**3. The Original Philosophical Method.** This method of presenting the philosophy of science would require us to heed the call of Husserl to "go back to the things themselves", that is, to go back to the etymology of the Greek word for philosophy and the core areas of philosophy which define its exclusive functions.

First, the Greek etymological combination for philosophy is *Philein Sophia*, "love of wisdom". We recall that science has been defined as knowledge of general laws governing particular, isolated, facts, that is, knowledge of what is true or false about things or events without extraneous considerations or regard for practical consequences. But knowledge of what is true or false (as in the case of knowledge of nuclear fission), if not guided by wisdom, is potentially very dangerous. We need wisdom to handle what is true or false, to deal with

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<sup>15</sup> Rene Weber,(ed.), *Dialogue with Scientists and Sages: the Search Sages: The Search for Unity*, (London: Routledge and Kegan Paul, 1986)

facts and to judge experience in an uplifting and beneficial manner<sup>16</sup>: "...Wisdom consists in making judicious balance of intuitive and discursive interpretations of our experience of being and of beings..."<sup>17</sup>

This wisdom which the philosopher alone generates through the exercise of the power of pure reason or transcendence is not available to the trained scientist. Consequently, the scientist is not equipped to guide and guard what he produces – knowledge of facts, of what is true or false – with wisdom<sup>18</sup>. This privation on the part of science makes the philosopher, the custodian of wisdom, indispensable.

Secondly, philosophy is sometimes, perhaps, less controversially defined in terms of its core areas of metaphysics, epistemology and ethics. It is the constant renewal and consideration of these core areas that endows the philosopher with wisdom, with the power to go beyond the boundary of ordinary facts to judge experience wisely. The core areas definition of philosophy takes philosophy to be the search for the ultimate nature of reality, truth and value. Metaphysics is the study of reality, epistemology the study or theory of knowledge and ethics the study of the norms of moral behaviour. A constant consideration of these exclusive core areas of philosophy leads to the cultivation of wisdom. And philosophy of any discipline such as science would consist in the application of the thoroughly considered opinion on any of the core areas of philosophy or a combination of same to the relevant discipline or any part thereof.

Consequently, a genuine philosophy of science is one wherein a trained philosopher injects his *a priori* metaphysical, epistemological or ethical notions into science with a view to elevating its empirical content to the rank of necessary, universal, truth. In other words, a philosopher in the realm of science, if he is to be true to his calling, is either metaphysicizing,

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<sup>16</sup> Sophie B. Oluwole, *Philosophy and Oral Tradition*, (Lagos; African Research Konsultancy, 1997), p.1

<sup>17</sup> E.A Ruch & K.C Anyanwu, *African Philosophy: An Introduction to the Main Philosophical Trends in Contemporary Africa*, ( Rome; Catholic Book Agency, 1981), p.27

<sup>18</sup> Bertrand Russell, *Op.cit*, p.x



epistemologizing or ethicizing science. This proposition holds good for the philosophy of any discipline whatsoever. Our assertion is supported by the great traditions in philosophy such as the works of Plato, Aristotle, Kant, Hegel, Heidegger, Russell, and Popper, to cite the conspicuous and eloquent examples.

We conclude this introductory essay by emphasizing that science or any discipline becomes originally, truly and radically philosophical if and only if a philosopher's orientation in metaphysics or epistemology or ethics or a combination of same informs the relevant science or discipline.

### 12.7.1 In-Text Questions (ITQs)

List three distinguishable methods of presenting philosophy of science.

### 12.7.2 In-Text Answers (ITAs)

The pedestrian method, the critical method, and the original philosophical method

## 12.8 Summary of Study Session 12

In this study session, you have learnt what science is, the relationship between philosophy and science, and the study of the meaning and nature of philosophy of science. The study session has introduced you to what fields of study can be placed under science, as well as the methods applied to enable the continuity of the field of science. You have further been acquainted with what it means to study science through the lens of philosophy, thereby understanding reasons for the existence of a philosophy of science as one of the infrastructural disciplines under the field of philosophy.

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