IS EDUCATION A SCIENTIFIC DISCIPLINE?

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Abstract

In this article the answer for the question 'is education a scientific discipline?' will be analyzed. Regarding this question, those who oppose the arguments that education is a scientific discipline and others who claim that education is not a philosophic discipline are both right. The question will be reviewed within the framework of philosophy's and sciences' basic structures. Those who claim that science is independent from philosophy and it develops by its own dynamics, also argue that the basis of philosophy depends on 'logic'. On the other hand, science states that 'logic' constitutes the structure and it has two different roles within two different disciplines. Logic is necessary but insufficient for science for this reason science and philosophy are totally different from each other, by making this presupposition the study will discuss if education is a scientific discipline or not.

Keyword: Education, Science, Philosophy, Mathematical logic, Knowledge

Introduction

Education is a dynamic process that is structured every era in accordance with that era's value, knowledge and technology/technical equipments. Possibly education owes its dynamism mostly to its internal structure. Just like in other eras, today, essential changes happen also in the field of education. Through these changes education adopts to the current era's value, knowledge and technology/technical equipments. Also, within history education has always developed and come until today through its dual relationship in a way that dominates current era, and it will keep its 'change' characteristic in future as well. Like all other disciplines education, as a changing and developing entity, also has its own unique features and it is important to answer the question: are these unique features are philosophy based or science based? Or, should it benefit from philosophy and science whenever necessary? Answers for these questions are of vital importance regarding the future objectives that education needs to reach. Also education will owe its unity to its ability to answer these questions clearly. Although they are two different disciplines, it is meaningless and useless to argue that philosophy and science should not interact with each other.

For example, science works by using epistemology which is a topic of philosophy (Özemre, 2007). Even if education is assumed to be a scientific discipline, it needs to be involved in an interaction with philosophy because it needs to use epistemology while producing knowledge and verifying the validity and solidity of this knowledge. Should education benefit from philosophy and science whenever necessary? Because of the fact that epistemology, which is a philosophic discipline, is used to answer this question, the answer can be: education benefits from philosophy. This answer does not satisfy this part of the question: should education benefit from science? Education is involved in an interaction with science also by using statistics while producing knowledge and by following a scientific path. The answer for the question 'should education benefit from science?' can be replied as: education benefits from science. In this article, the question: 'should education benefit from philosophy and science whenever necessary?' will not be included because it leads to solid rules and useless discussions. This article will question if education is philosophy-based or science-based, the answer of this question includes the objectives that education needs to reach and its unity.

Today the debate between supporters of the argument that education is philosophy based and others who support that education is science based, continues to exist just like in the past. These discussions point that education has a certain characteristic in its basic structure that should always be questioned. One of the reasons of the discussion whether education is philosophy based or science based is the existence of arguments claiming that philosophy and science are two different disciplines of the same field.

The mistake that philosophical and scientific environments make by arguing that science is a discipline of philosophy (another topic has been discussed by philosophical and scientific environments is to attribute ethics, which is the topic of sociology and philosophy, to science and make mistakes due to this wrong designation. Ethic, as a concept, is peculiar to the human beings and changes according to the cultures. The aim of science is to understand the external world and for the knowledge that it eventually produces it is possible to think the following approach: 'there is ethics of science and there is no ethics of science' and it is possible to conclude that there is ethics of knowledge because knowledge (an abstract concept) is evaluated by ethics, which is a concept peculiar to the human beings. Another different mistake is to evaluate science's ethics through the scientist's ethical understating.

This reminds us the confusion of 'science' and 'scientist', which also affects education), also affects education Separate answers will be provided to those arguments support that: philosophy and science are different disciplines of the same field, and arguments that science is a discipline of philosophy. This is the same answer for the question: 'are philosophy and science different disciplines?' In order to find clear answers for questions: 'is education a scientific discipline?' or 'is education a philosophical discipline?' first of all there will be an analysis of basic structures and historical background of both philosophy and science. Furthermore, after clarifying the difference between the basic structures of philosophy and science it will be easy to answer if education is a scientific discipline or philosophical discipline.

Theory

Today opinions on the difference between philosophy and science are collected under different titles. They can be collected under three headings: a) there is a difference between philosophy and science, b) they were separated by force, and c) there is a difference due to the resource problem. These three views can be understood as: there was no difference between philosophy and natural sciences until seventeenth and eighteenth centuries. With the start of putting empirical studies at the center of science, philosophy, which cannot be subject to experiments like natural sciences, was blamed to produce tautological premises and started to be evaluated as a subtitle of theology. By nineteenth century this difference lost its old semantic meaning that philosophy and natural sciences are different but equal in nature (Gülbenkıan Komisyonu, 2005).

Another different view regarding the difference between philosophy and science is:
…There was no difference between philosophy and science until the mid even end of the eighteenth century. In the modern age 'science', which dominated people, nature and society, was redefined as a tool to exploit nature for the sake of humanitarian benefits in relation to a 'new' extent and context, and it was separated from philosophy under the name of 'emancipation of sciences' in order to clean it from 'philosophical sweeps'. As a result, sciences fighting for being independent from philosophy, especially applied sciences came to the fore and they became a hegemony in everywhere particularly in universities…Consequently, philosophy and science were separated by force under the positivist/pragmatist/technical paradigm (Özlem, 2001).

The facts that: scientists and scientific institutions have integrated with market mechanisms, funding for research projects have changed from public sector to private sector, bottleneck of higher education (universities) regarding funding and power struggles over free movement of knowledge are leading to important problems (Dural, 2008). In bourgeoisie societies, higher education institutions particularly universities, parallel with the industrial capitalism, became centers for proliferating civil cultures and producing national elites (Çiğdem, 2001). Academicians, who try to find secure hole in order to procure acceptance for their freedom or at least social beneficialness, created structural pressure so as to maintain gradually increased specialization and promoted specialization by providing required resources in economical development (Gülbenkıan Komisyonu, 2005). While taking into account universities' such relations, Dural (2008) relates the dissociation of philosophy and science especially to today's resource problem, and claims that science is divided under sub disciplines and became more distant to each other.

Mathematical logic background

In order to understand the basis and reasons for the differentiation between philosophy and science, it is important to analyze not only these ideas but also history of philosophy and science. The first thing that should be considered regarding the very difference is: to analyze the history of mathematical logic, which is the tool to understand as well as do science and used to reveal a scientific theory and constitutes the basis of scientific logic (Özenli, 1994).

By doing so it is possible to comprehend accurate reasons of differentiation between philosophy and science. Among different two movements that have very long histories, history of 'formal deduction' goes back to Aristotle and Euclid (and others); and other movement's history, 'mathematical analysis', goes back to Archimedes from the same period. Throughout a long period of time, these two movements have developed separately. In 17th and 18th centuries it was started to combine these movements, which had developed separately, through Newton's and Leibniz's differential and integral calculations. As a result, logic and mathematics started to come together. In other words, it was started to base logic on mathematical principles (Özenli, 1999, 1994). This has started the definite and accurate differentiation between philosophy and science. In order to analyze this more clearly following examples were selected:

Known as Newton's second law of motion;

$$F = ma \qquad (1)$$

structure of logic by differential and integral calculations

$$F = m\frac{dV}{dt} \qquad (2),$$

combining a and v with mathematical analysis by using differentiation and integration

$$V = \frac{dx}{dt} \qquad (3),$$

combining v and x with mathematical analysis via differentiations and integrations, from equation 1 like the work-energy theorem;

$$W = Fx \qquad (4),$$

mathematical analysis from the structure of logic;

$$W = \frac{1}{2}mV_s^2 - \frac{1}{2}mV_i^2 \qquad (5)$$

$$W = \Delta KE \qquad (6).$$

from Lagrange's equations;

$$\frac{\partial L}{\partial q_i} - \frac{d}{dt}\frac{\partial L}{\partial \dot{q}_1} = 0 \qquad (7)$$

i=1,2,3

$$F_i = \dot{P}_i \qquad (8).$$

Newton and Lagrange equations' transfer from one to other via differential and integral calculations, again from equation 1;

$$E^2 = P^2c^2 + E_0^2 \qquad (9),$$

With the transfer to Einstein equations via differential and integral calculations, and ability to provide mathematical analysis of logical structures, philosophy and science were definitely separated from each other. Science started to work by subjecting logical premises to mathematical analysis and basing them to logical premises which are proved to be valid in advance. This situation not only separated philosophy and science from each other but also created separations within science, and with Newton modern science was born. In logical structures being able to transfer from one to other via mathematical analysis, and perceiving one of the logical structures as real, after experimental confirmation; prove that the other logical structure also constitutes a structure of reality. Among logical structures, transferring from one to other via mathematical analysis forms correspondence and continuous stability principles, which are basic scientific principles as well.

Correspondence and continuous-stability principles are first basic differences between philosophy and science. Laws in every scientific discipline, unlike in Physics, may not be expressed by formulas; in this case, because there will be no ability to transfer from one logical structure to other via mathematical analysis, is it possible to consider correspondence and continuous-stability principles? This kind of question indicates that it is been alienated to the essence of above mentioned examples. Yet what was done in the above mentioned example was to conduct a mathematical analysis of real logical structures via differential and integral. It is not the case to argue that these logical structures are required to be subjected to mathematical analysis only via differential and integral. In essence, here, logic was subjected to mathematical analysis and logical structures can be analyzed by them as well as by other mathematical analysis tools.

It is true that logic and mathematics started to converge by Newton's and Leibniz's differential and integral calculations; however, Boole and Frege were the scientists who combined mathematics and logic. As a result of Boole and Frege's studies to establish a final and accurate form for the true nature of formal deduction, mathematics and logic started to converge. Boole developed a symbolic system from Aristotle's deductive reasoning. Frege formed 'predicative calculus' by expanding Boole's 'symbolic system of deductive principles'; as a result, they founded the basis of mathematical logic (Özenli, 1999; McCarthy, 1988; Uspensky, 1992; Heijenoort, 1970; Fazlıoğlu, 2002). George Boole found that, by adequately representing Logic, it became a branch of Algebra in a precise sense: all known results in Logic (and some unknown) could be obtained by the use of standard mathematical techniques. Two facts were crucial for Boole's discovery:

(i) First, the change in representation from a philosophical view of Logic as an enormous complex structure of syllogisms and conditional statements, to a view of it as (possibly) fitting the general scheme for any branch of Algebra. Simplistically, the scheme consists of a set of very simple objects that are subjected to operations on numbers. (ii) The second fact was the successful application of the MSS to Logic, which meant that some (interesting) subset of properties of the operations on numbers held also for Logic. This made it possible to use the powerful tools of Mathematics on this new domain of Logic (Ledesma, et al, 1997).

Frege, also wished to apply it to making reasoning about human affairs more rigorous. Indeed, Leibniz was explicit about his goal of replacing argument with calculation. However, expressing knowledge and reasoning about the commonsense world in mathematical logic has entailed difficulties that seem to require extensions of the basic concepts of logic, and these extensions are only beginning to develop (McCarthy, 1988).

When some logicians began to shake of the Aristotelian and scholastic chain of formal reasoning in the 19th century, none of them may have imagined that logic would become one of the most expanding fields of mathematics in the following century, which attracted more researchers than the complete 19th century mathematics of the Western hemisphere. None of them may have imagined, either, that formal logic would become one of the most important theoretical bases for what at that time was called calculating machines (Wagner-Dobler, 1997). The mathematical neglect of logic vanished only hesitatingly. In the forties and fifties of our century, finally, that kind of philosophy definitely entered its epidemic state, showing an exponential growth in terms of the number of participators and papers (Wagner-Dobler&Berg, 1993).

Whatever the choice of symbols, all kinds of mathematical logic share two ideas; First, it must be mathematically definite what strings of symbols are considered formulas of the logic. Second, it must be mathematically definite what inferences of new formulas from old ones are allowed. These idea permit the writing of computer programs that decide what combinations of symbols are sentences and what inferences are allowed in a particular logical language (McCarthy, 1988). The term "mathematical logic" is understood in a broad sense. In this sense it, like Gallia in Caesarian times, i divided into three parts: 1) mathematical logic in the strict sense, i.e. the theory of formalized languages including deduction theory, 2) the foundations of mathematics, and 3) the theory of algorithms (Uspensky, 1992).

Carbon dioxide's (CO_2) logical structure to explain transformations of solid, liquid and gas,

$$i \times j = k \quad (10)$$

$$j \times i \neq k \quad (11)$$

Analyzing mathematical equations and transformations by using the physical structures, it is found that CO_2 exists in gas phase under normal conditions. If CO_2 is subjected to high pressure at -78.9 ^{0}C, it transforms to solid phase from the gas phase (Sørheim, et al, 2006). Does CO_2 keep cooling if it is subjected to high pressure even after all its parts transform to solid phase? Logically, it can be argued that it keeps cooling. However, in reality no significant temperature change occurs when high pressure is applied on solids. This result can be reached if mathematical logic is used as an analysis tool (via equations 10 and 11). Also, by using equations 10 and 11 it can be claimed that CO_2, in solid phase, cannot maintain -78.9 ^{0}C when it is subjected to high pressure.

Philosophical background

In order to better analyze the difference between philosophy and science, this part will start with answering the question: 'what is philosophy?'.

Accordingly, philosophy is: 1) an effort based on reason, which shows the transformation from ‘mythos’ to ‘logos’, 2) philosophy is wisdom, it is an effort to have knowledge, 3) philosophy is a ‘science’, it is the ‘science of sciences’, 4) philosophy is the absolute knowledge of both ‘theory’ and ‘praxis’, 5) philosophy is to fascinate, 6) philosophy is to ask question, 7) philosophy is to suspect, 8) philosophy is to ‘research’, 9) philosophy is to enlighten, 10) philosophy is reasoning and grounding and 11) philosophy is a critical reflection (see: Çilingir, 2002). Variety in philosophy’s descriptions may stem from its perception of knowledge and reality. In the history of philosophy the origin of knowledge has always been investigated. There is a constant conflict between proponents of Wolff’s rationalism that prioritizes reason as the origin of knowledge and proponents of Hume’s empiricism that supports the idea that knowledge originated from senses, that is, experiments (Oeser, 2004) In philosophy, what lie behind the basic discussions regarding the origin of knowledge are: lack of clear definition and discussions about the existence of reality. If the differences between the knowledge that philosopher describes as: ‘an abstract concept’ and the knowledge that is defined for educational goals are not considered, then different problems may emerge.

In rationalism, reason is prioritized as the origin of knowledge and it is accepted as the source of knowledge. Rene Descartes (1596-1650), Baruch Benedictus Spinoza (1632-1677), Gottfried Wilhelm Leibniz (1646-1716) and Christian Wolf (1679-1754) can be counted as the most important representatives of this movement after the ancient time. Ronald Giere has given the following description to a supposedly typical, radical form of rationalism that he opposes: A supporter of a position which fits Giere’s description believes that there are methodological rules which (1) are precise (since they always lead to a well-defined conclusion), (2) are quite general (in the sense that they always yield a well-defined answer to the question to which extent a theory has empirical support), (3) are such that scientists actually evaluate theories in a way which is compatible with them (since the rules only make explicit the principles that the scientists employ anyway), and (4) are rationally justifiable without making reference to any scientific beliefs (Kieseppa, 2000). Modern rationalism, represented by such figures as Descartes, Spinoza, and Wolff, is a species of Western rationalism, but it is a particularly clear instantiation of its general oblivion of being. For modern rationalism, non-contradiction and the ego are the highest principles of truth, and logic as the science of propositional thought is the science of being. Such rationalism, on Heidegger’s analysis, consists of two entwined prejudices about the relation of thought to being. The ancient prejudice, which dates to Plato and Aristotle, takes judgment as the locus of truth and consequently takes the correspondence of judgment and object as the essence of truth (Engelland, 2008).

Empiricism, at least in the way Bacon stated it, seemed to be a straightforward declaration that experience would free human knowledge from the limitations imposed by traditional philosophy. After all, Bacon argued, traditional philosophy, structured by the syllogisms of Aristotle, could not adequately describe the nature of the physical universe. When, however, Robert Boyle set about applying Bacon's motto "Nullius in verbo," he did so as a convince Empiricism, at least in the way Bacon stated it, seemed to be a straight forward declaration that experience would free human knowledge from the limitations imposed by traditional philosophy. After all, Bacon argued, traditional philosophy, structured by the syllogisms of Aristotle, could not adequately describe the nature of the physical universe. When, however, Robert Boyle set about applying Bacon's motto "Nullius in verbo," he did so as a convinced atomist (Renaldo, 1976). Empiricist thought: (1) Baconianism: knowledge of the world can (and should be) attained without hypotheses, using systematic methods of inductive inquiry; (2) associationism: knowledge is obtained from the association of impressions in phenomenal experience; (3) cognitive calculi: cognitive processes may be modeled mathematically and may be augmented by mathematical devices; (4) phenomenalism: the only reality is that which is perceived, and for statistics the only reality is data(Mulaik, 1985). Radical empiricist is possible that only experience actually exists.

For we can give sense to the question of whether purportedly independent objects actually exist, only within our conceptual scheme, and the answer it receives is a commonplace affirmative. It now appears that the phrase 'experience of the objective world' is to be understood as indicating the actual existence of such a world, with which some cognitive consummation is, effected (Davies, 1983). Through Kant’s critical determination of judgment and of thought in general, intellect us, the presumption of uprooted understanding is metaphysically overcome for the first time in a more grounded manner (Engelland, 2008). Kant’s own system of transcendental idealism can and must be understood as a kind of master plan for a solution of this main dialectical problem, known as his third antinomy, together with related dilemmas in the areas of cosmology and psychology.

Ultimately, Kant wants to convince us of the kind of compatibilism that follows (Stekeler-Weithofer, 2006). the Transcendental Deduction results in us favorably entertaining the conclusion that, as a necessary condition of the possibility of experience, experience itself 'must have such internal, concept carried connectedness as to constitute it (at least in part) a course of experience of an objective world. This is 'the thesis of objectivity' (Davies, 1983). According to Kant, the principle of causal connectedness, according to which any event has sufficient reasons in the Aristotelian sense of efficient causes necessarily producing the event, is neither a law in a metaphysical or transcendent world of natural things in themselves, nor a merely subjective form of pragmatic expectation that the future will somehow resemble the past. Hume and his empiricist followers claim that causal explanations are only stochastic and subjective. This is a nice claim. Because now, no categorical difference can be formulated between the vague degrees of certainty with which I expect some future behavior of, say, the movements of the planets, a cat, or a man. Hence, there is no categorical difference between believing or knowing something about nature at large and about ourselves, i.e. about human behavior. Kant assumes that the possibility of causal explanation of relative movements of things according to generic laws is constitutive for any object related knowledge claim. And Kant accepts at least this much from Hume’s anti-metaphysical skepticism insofar as he claims that these transcendental conditions do not refer to things in themselves about which we know nothing, but to the realm of possible experience or phenomena as controlled by us in joint observation or Anschauung (Stekeler-Weithofer, 2006).

Popper (1959) originally presented a simple deductive model of explanation: To give a causal explanation of an event means to deduce a statement which describes it, using as premises of the deduction one or more universal laws, together with certain singular statements, the initial conditions. Deductivists similarly proposed that an empirical law could be explained by a theory by being deduced from more general laws and facts about specific systems. This model is implicitly abandoned in Popper's later discussions of the relations between Kepler's laws and Newton's theory where he realized that Kepler's laws are explained by Newton's theory without being deducible from them. Reflection on this example also led him to withdraw his earlier claim that new theories are usually sought after the experimental falsification of the accepted ones. There was no such failure of Kepler's laws; Newton was led to his theory by trying to explain the laws of celestial and terrestrial mechanics. Only after the new theory was developed were the relevant observational tests made (Enfield, 1991).

Discussions

Quality of the generated knowledge is the most important reason for the differentiation between philosophy and science. While generating knowledge Popper (1959) claims that, it is not always possible to prove logical accuracy of universal statements, which are derived from private statements; he supports this idea by using his famous swan example. He suggests that negation of universal statements, which are derived from the private statements, should be consistent (logically possible). On the other hand, regarding synchronism, Griffiths (1999) mentions that; an observer, who hears the crash of thunder after a while of lightening to flash, may think that the sources of light and sound are not synchronized. During the observation it is required to take into account the time that signal (sound, light etc.) needs to reach the observer. As a result, what is seen is not what is observed. Observation emerges after the event takes place; all data are collected and revised. According to Özenli (1999), real observations, data flow perceived by real senses, visual and tactual (sense of touch) impressions, judgments, contrary to the expectations, do not form knowledge by themselves; he thinks that in order to form knowledge deduction, reasoning and decision making elements should be taken into consideration; and he further defines knowledge as: forming semantic correlation between sub unites and partitions of data flow, using logics rules, mental mutation and re-combinations of these entities.

Popper (1959) defines scientist’s duty as: providing statements or system of statements and examining them in a systemized manner. He also claims that, in empirical sciences, specifically, assumptions or hypothesis systems should be presented and examined through observation in an experiment-based manner. According to Özenli’s (1999) limitation regarding this idea, pure logical ideas cannot provide any ‘knowledge’ about empirical world, all knowledge about reality starts and finishes with experiment or experience. Logic constitutes the ‘structure’ in a ‘knowledge system’. In philosophy there is an important question: do proponents of the idea that general ideas and knowledge in mind are composed of senses, that is, experiment/experience; those who support Kant and his ideas which combine rationalism and empiricism, and others who advocate that science starts and finishes with experience, share the same structure? The answer is no, and to better study this answer Griffith’s expressions should be analyzed.

What is observed can be called as observation only after collecting and correcting all data after the observation. For philosophical disciplines, data gathered through observations are enough for building the logical structure. What Popper chooses is analysis through experience and observations, he supports this idea when he claims that negation of universal statements, which are derived from the private statements, should be consistent (logically possible), and defines scientist's duty as: providing statements or system of statements and examining them in a systemized manner, at the end he addresses to the point that analyzing in a systemized manner is necessary. On the other hand, in science it is not sufficient to establish logical structure via data collected through experiment and observation, it is also important to conduct mathematical analysis of data and form logical structure, which is peculiar to science. This constitutes two important principles of science: principle of correspondence and principle of continuous stability. Another difference in knowledge is objectivity. Knowledge in science should be objective and it should include minimum anthropomorphic feature. Does objectivity emerge from the theory's predictions and convenience of experience? Is any convenient theory objective? The answer is yes, but this is not enough. A theory should already be objective in order to be convenient. Also correct predictions of events are not enough either. Objectivity criteria should be searched within a theory's internal structure such that it should be in a formal structure that corresponds to reality. In other words, objectivity is equivalent to scientific rules' 'invariability'. Objectivity is not equivalent to physical phenomena or invariability of observations (Özenli, 1999). This is what divides those who support empiricism in philosophy and science.

Science can be described as 'systematic knowledge that is shaped and examined experimentally and observationally' (Özemre, 2002). According to Özenli (1999), this definition can be valid in daily life but it does not reflect science's real description. Several scientific disciplines provide different definitions of science from their perspectives, for this reason there are many definitions; however, in reality there is only one real definition and this does not change according to various scientific unites. Science is an activity in which reason has 'self-comprehension, self-reference and self-construction' capacities and it is the manifestation of reason's supernatural competence and talents. In the great scheme of things, science is a 'true thinking' action. By true thinking, philosophical thinking is put aside. By supporting scientific thinking instead of true thinking, it is alienated from explaining a premise by using its premise. At this point it becomes essential to describe 'true thinking' scientifically. It is possible to consider true thinking as long as the key words used for definition of science– discovery of self mental foliation structures and effective excitations that enable transitions between mental the phases- are known successfully. In order to be successful; "operational research, cybernetic, mathematical logic and scientific methodology' should be used (Özenli, 1999)".

Another reason for the difference between philosophy and science lies behind the logical analysis of generated knowledge. Mathematics is taken into consideration because in this case logical analysis is not based on experiment and observation. Until the period starts with Newton and Leibniz, science used to produce knowledge in a similar way with philosophy. The fact that Newton and Leibniz established the analysis of logic by using mathematical laws, not only differentiated philosophy and science, but also science within itself. Thanks to Boole and Frege's efforts to build a final and clear form regarding the real nature of formal deduction, mathematics and logic became closer. Boole developed a symbolic system of Aristotle's deductive reasoning. Frege expanded Boole's 'symbolic system of deductive reasoning' and found 'predicative calculus'. At the end of the day, they established the foundation of mathematical logic. These scientists, who have important contributions to modern science, enabled logical premises or logical inferences to be examined person-independent and made it possible to correspond generated knowledge as a part of reality. As a result, they enabled to base this generated knowledge on an avalization, in a way that everybody can reach and form it. This avalization is not encouraged by political laws or power of people, who surrounds a theory; rather, it gets strength from mathematical analysis that is universally proved to be true.

Modern science was founded in 17^{th} and 18^{th} centuries by mathematical analysis tools, mathematical logic and Newton's laws. As from this date, which is a new period, the bases of science are: correspondence, continuous-stability, objectivity and simplicity (Özenli, 1999). Thanks to Newton and Leibniz, with the start of the period that logic can form mathematical principles, modern science has been developed independent from philosophy and philosophy has been developed through logical principles that form its essence. There might be a need to make an analogy between rationalism, which prioritizes reason as the source of knowledge and accepts it as the origin of knowledge, and science because its uses logical structure while generating knowledge. In science, while producing knowledge, mathematics and mathematical logic are used as logical structures.

It is not the case to use pure reason, in science, as the logical structure. In order to better understand this differentiation in science logical structures of formulas in the equations from 1 to 11, can be analyzed. Logical information in these equations enables the transition from one logical structure to other through the mathematics and mathematical logic analysis, also enables knowledge to be perceived as a part of reality. Furthermore, through these mathematics and mathematical logic analysis; correspondence, continuous-stability and objectivity principles are provided for logical knowledge. From this perspective philosophy's rationalist arguments and science are differentiated.

Characterizing science with: a) causality principle, b) determinism principle, c) measurability principle, d) consistency principle, e) fallibility principle, means nothing but presenting a philosophical approach. If science is characterized through these principles, efforts to correspond science with its four basic principles will never yield a result. Due to the facts that determinism principle gives place to indeterminism (which is a philosophical evaluation) and the contradiction between determinism-indeterminism principles and fallibility principle and at the same time because of these principles' internal structures correspondence, continuous stability and objective knowledge will not be generated, hence it is not possible to argue the existence of science that owes its existence to these principles. This situation explains the basis and reason for the differentiation between philosophy and science.

Result and Suggestion

If philosophy is analyzed from a scientific perspective, it can be seen that philosophy, in essence, is contrary to science because it has no definition by common consent and present definitions contradict within each other. Science is a discipline different than philosophy regarding its experiment/experience perspective and quality of logical structures. Establishing or presenting scientific principles on a philosophy based manner, from science's perspective, are nothing but meaningless and inconclusive efforts.

Given that knowledge at the starting points of mind based learning, learning from interrogation, question based learning or constructive approaches and other educative methods and techniques, education cannot provide correspondence and continuous stability principles and gets its strength from political laws or people surrounding it. Likewise, knowledge that educational sciences presents cannot meet the criteria of 'scientific objectivity'. Education cannot generate knowledge with correspondence, continuous-stability and objectivity principles; therefore it needs philosophical movements and their compliances while producing knowledge. Because of the fact that education generates knowledge within the framework of these movements' compliances, education is a philosophical discipline. Although in education mathematical analysis like statistics or experiment-observation techniques are used, the knowledge it generates is subjective. This kind of knowledge changes from one person to other, or requires personal acceptance, it cannot form a universal knowledge, and from these perspectives education is a philosophical discipline.

In order to establish education on a scientific base it is of primary importance to use the control method that science uses: 'cybernetic' and restructure both education process and education's internal dynamics (its definition) regarding the cybernetic. Cybernetic should be prerequisite for education and mathematics and mathematical logic should be used while producing knowledge. If the knowledge that educational disciplines produce succeeds in providing correspondence, continuous-stability, objectivity and simplicity principles, then education can obtain scientific discipline qualification. Education cannot be a scientific discipline only by people's efforts to see it as a scientific discipline, this at best means to hide the truth or to be ignorant. At the end of the day, this situation not only prevents to form a universal goal for education, but also prevents to unite it. Lack of universal goal leads education to keep up with the times by countries' own efforts, which incites transnational as well as intercultural conflicts. In conflictual environments, the possibility to affect negatively the developments of societies, and fields such as science and technology increases.

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