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Research Article

Social, Psychological, Philosophical and Educational Bases of Science Education: Chaos and Order

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Abstract

Science education should include approaches that will create individuals' and society's sub-structure of the science. For this purpose, an analysis has been made by taking the philosophy, psychology and sociology of science into account. . According to this analysis, these disciplines, changing from regular structures to chaotic constructions, suggest that science education must evolve from the presentation of regular structures to the presentation of more complex structures. Explaining simpler and more organized things called "science education" does not contribute to the growth of new scientists.

Key Words

Chaos and order • Science education • Nature of science

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The method put forward in the resolution of questions and problems facing humanity is very important. Thanks to scientific methods, people have survived despite epidemic diseases. Therefore, it has been important to teach the science. Being refuted by scientific methods of misconceptions about the universe, humanity has embraced the science and scientists (Kirkpatrick, 1943).

A stone taken from the ground is thrown for war or to understand its movement. This difference tells us the process of disintegration of science and technology. Science has progressed faster in times of peace, in free-thinking environments, and in technology in terms of war and competition. In this sense, it is not possible to think science and technology separately from people (Narin & Noma, 1985). As an evolving living creature, human beings continue to preserve their primitive side. The primitivehuman thought structure naturally required the primitive aspects of science and technology.

Psychology has emerged as a result of different perception of the universe. The difference of our perceptions; genetic and environmental factors and our accumulated knowledge   interact with the information we have acquired. Psychology examines the different situations that arise from this interaction.

All psychological illnesses (Johnson-Laird, Mancini, & Gangemi, 2006) are actually mis-perceptions (emotions). The interpretation of all the perceptions that we are not ill is called philosophy. The individual aims to reach a conclusion by combining all his perceptions. Consistent meanings of both the interaction and the perception of the universe constitute the acceptance and principles of the person and the society, that is, the philosophical movements (Chesters & Welsh, 2006).

An interaction occurs when every consistent and meaningful information that an individual or society receives is shared with other individuals or societies. The name of this interaction is education. As interaction increases, education increases. Interaction is bi-directional in teaching and learning. The reality is not the teaching and learning but the interaction called the tearning (Bülbül & Karaman, 2017). If the teacher learns something from his student, he can teach something. The interaction involves different forms, such as listening, watching and speaking.

If you explore the effects of interaction within society, you will discover sociology. Sociology examines weak and strong interactions between individuals. Thus, the types of interactions that influence the formation of educational movements. For example, communities that interact remotely with a computer have created a trend called "computer-based education"(Alpert & Bitzer, 1970).

If the perception of the individual is similar to the perception of the majority in society, we can begin to talk about the psychology of society (Ginsberg, 1921). Psychology of society can show similarities with the psychology of the individual as well as differences. Similarly, coherent and meaningful information that an individual has may be available to society as a whole. The majority of society can accept a philosophical movement. The relationship between different philosophies in society and the individual and other societies that have adopted different philosophies of society is always the topic of social philosophy (Hardimon, 1992). Education of societies at different speeds, and studies of what types of interactions work in society constitute the field of educational sociology. The structure of the society as seen; the individual's perception, the meaning of the information, and the interaction with other individuals. This dependence actually tells us how complex the situation is.

The problematic perception of the individual can lead to a problematic philosophy, a problematic education and a problematic social change (Ryder, 1965). As a result of such problematic situations society has invented a method called "science". Science has created the methods that aimed to make the individual and the society understand meaning far away from the false perceptions.

The information that the individual perceives, reflects and shares is returned to him in the social environment as feedback. Every feedback leads to the change of sentiment and meaningful information. Every change is caused both by the perceived and the created knowledge as well as by the change in the brain that makes these works. As change continues, both ideas and brain develop. At the end of the process, both the individual and the social environment develop (Figure 1).
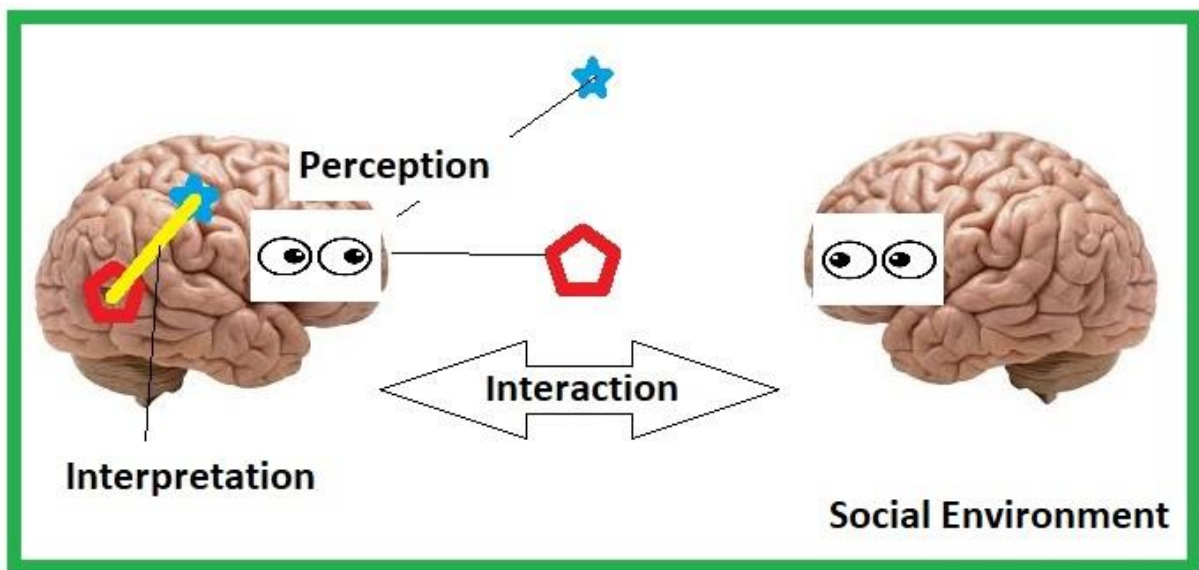

Figure 1. Perception, interpretation and interaction in social environment.

The strong interaction between individuals ensures that our perceptions and the information we associate are questioned. The development of strong associations of individuals with individuals and with other societies allows for a more consistent and lifelong thinking. Individuals who have strong perceptions or strong interpreting perceptions can sometimes lead because of collective philosophical movements. What is the main characteristic that differentiates leaders from psychology, philosophy, education and sociology?

Method

This article is based on the relationship between science, science education, chaos and order and the content analysis of science branches such as philosophy, psychology, sociology and education. The fact that the concepts of chaos and order that emerges from the functioning of nature reveal how it exists in the nature of science, necessitates it to exist in other branches of science. This work is the result of this verification effort.

If each case in the nature interacts with another case, this interaction network can not be examined with the isolation of all the network elements except two. We know this new approach, which is very variable in the understanding of nature, as chaos researches. The examination has been carried out by way of example cases in the science branches studied. In this sense, this study can be called a chaos survey involving a case study in science and its branches.

Chaos and Order

People understand the universe and create new theories. One of these theories is the theory of chaos. Chaos theory examines the multifaceted interaction of the universe. The interactions to be investigated before this theorem were tried to be examined by downloading two variables but it is known that it is almost impossible to find a system with two variables in the environment. As you walk in the woods, you observe that the stones are not evenly distributed. In the same way clouds form irregular figures. If air molecules were regular, we could not breathe. In short, chaos refers to life and explains the multi-variable nature of the universe.

When the contents of the Chaos theory are examined, it seems that many fields such as physics, mathematics, art and economy are applied. For this reason, scientific pioneers are inevitably involved with the theory of chaos, even if it is superficial. When examined in detail and comparatively, it is seen that the fields of philosophy, sociology, psychology and education give a variety of products from order to chaos (Figure 2).
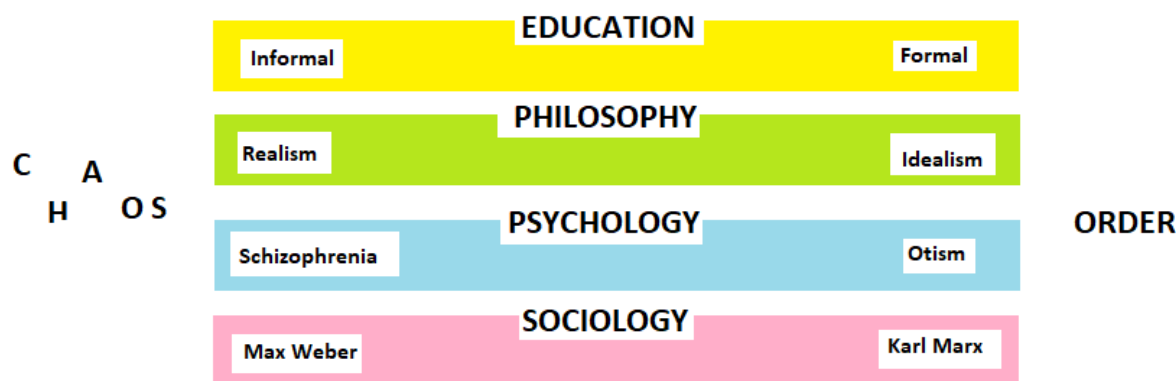

Figure 2. Distribution of some disciplines, from order to chaos.

When the concepts of chaos and order are reflected on education, philosophy, psychology and sociology, it is understandable how the functioning of the universe affects society and the individual. For example, there is more irregular education outside of school than "informal" when regular education is being provided in schools using a curriculum. On the other hand, the most important discussions on philosophy have been carried out by idealistic and realistic philosophers. Idealism emphasizes coherent, unrealistic constructs, while realism emphasizes realistic but inconsistent constructs.

Surveys on perceptions in psychology have shown that autistic individuals have difficulties understanding metaphorical meanings and that some senses are very sensitive. Autistic individuals prefer one type of communication channels. For example, they do not prefer to use face expressions other than their primary meaning, but communication is an extremely complex process. On the other hand, schizophrenic individuals can perceive the same event in more than one character. This introduces us to another reality that goes beyond reality.

Finally, Marx's clear definition of social class and order is a regular sociological analysis of Weber's flexible and realistic assessments. According to Weber, rationality is even more preliminary, which includes the interaction of more complex elements (Bendix, 1974).

All the evolutionary processes in these areas show the importance of chaos theory for science. When the history of science is examined, relativity shifts are seen from positivism and determinism. The idea that the point of view will not bring about the definite truth is more common nowadays, in the opinion that the principles are valid only in limited contexts. It reminds us that the number of observers and the multiplicity of affecting elements can not be examined in one dimension. For this reason, the projects are carried out in a multi-disciplinary manner and the disciplines are intertwined (The creation of STEM Education). In short, regular explanations have left room for complex explanations in the scientific world, and this has led to changes in how science is taught.

Lineer or Non-Lineer Science Education

One of the most difficult areas of study in education is conceptual change. Correcting the misconceptions that occur in students' minds is more difficult than the first narrative. For this reason, creating cognitive chaos is the first step in removing the misconception. It is essential to create a cognitive chaos to create a new structure. For example, the Moon is not around the Sun and thinks that the Earth is turning around. "What happens if the world disappears?" To ask is to create a cognitive chaos (Limón, 2001). Chaos and order always come in succession.

Research in the field of science have been based on examining the relation between two variables at first and area and slope calculations have been made using uniform geometric constructions. Later on, new calculation methods for the non-linear states of the two variables were found. Thus, more realistic information has begun to be generated. It is almost impossible to see equally spaced movements in the same time way in the nature (Figure 3-A), but accelerating motion is very common (Figure 3-B).
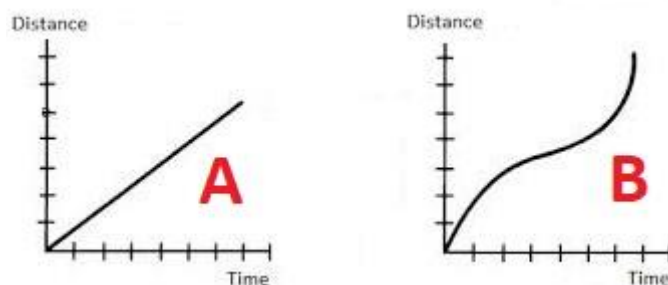

Figure 3. Linear (A) and nonlinear (B) relationships between distance and time.

As we make more detailed and precise measurements, we actually see that the situation is different. The multiplicity of data obtained in small time intervals made it necessary to calculate it as if it were linearized by statistical methods. We tried to make sense of events with a single value (best fit line) that has the power to represent all values instead of multiple values. The perceived multi-valued structure and the one-valued structure used as a commentary were always obstacles, as if it were the truth (Figure 4). Chaos theorem provides us to make sense of these multivariate constructs.
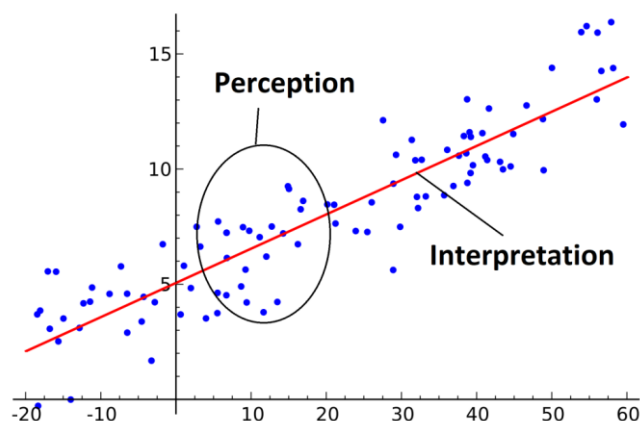
Figure 4. Interpreting the perception.

The modeling over time, taking into account the interaction of the three factors that affect each other in non-linear forms, will help to better understand the mechanism. it is important to change the state of the hidden third factor in the process from two factorial structures and to examine it in science education (Stamovlasis, 2017). In general, interpretations are statistical meanings and are used to explain the perception. However, you need a more comprehensive model. It is taught to make a limited interpretation in science education in order to make it easier.

Conclusion

Doing science is a way to understand the universe and ourselves correctly. In this sense, there are two different fields of study in which new relations and formulas are formulated. The branches of science - education, philosophy, psychology and sociology - are influenced by the chaotic order of the universe as content. For this reason, it is necessary to use chaos and order-centered approaches of other branches of science in science education. Science education is always focused on simple teaching, virtual conditions. Instead, a science education should be shaped through less idealized, real, chaotic environments.

Science is a product of the human brain. Man prefers to simplify to understand the brain. In the future, the scientific perception of the brain that will evolve through evo lution and medicine will change. If astronomy is a primitive science, today's understanding of science will also be exposed to criticism in later periods. The reason for these criticisms is the understanding of the primitive parts of the brain. It can only be escaped from these insights by a variety of explanations. Although the brain rejects this concept, scientists must strive to remove this principle with the common mind that they will form. Similarly, educators should stop introducing nature over ideal and isolated environments and use more chaotic / multi-factor models.

The relationship between chaos-order model, which is a description of science-nature and science mentioned in this study, can also be tested by large data or social media network analysis. For example, when compared to random sites (orders) on the internet and sites (chaos) that change millions of times a day, we encounter social constructs with different aims and psychologies. Sites that constantly change like a living thing are actually environments where innovations will emerge. Hackers that are destructive to these sites are naturally occurring against site builders. Every scientific approach triggers researchers in the opposite opinion. Sometimes nature is in structuring and sometimes it collapses. This differentiation exists in science, in branches of science and in teaching of science.

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