



Analysis of Chaos and Complexity in Schools According to Principals' Opinion

Okul Yöneticilerinin Görüşlerine Göre Okullarda Yaşanan Kaos ve Karmaşıklık Durumlarının Analiz Edilmesi

Süleyman GÖKSOY¹

Abstract

The purpose of the research is to determine the chaos and complexity experienced schools according to principals. Case study design, one of the qualitative research methods, was used in the research. The data were obtained using semi-structured interview from qualitative data collection tools. The criterion sampling method, one of the purposeful sampling methods, was used to determine the study group of the research. Research data were collected from 13 principals working in pre-school (3 principals), primary school (3 principals), middle school (3 principals), vocational high schools (2 principals) and high school (3 principals) in Duzce city center in 2015-2016 academic year. The collected data were analyzed by descriptive analysis technique. In this direction, similar data were gathered together within the framework of certain concepts and themes and they were later organized and interpreted. The opinions of the participants were presented without making any changes. The identities of the participants were kept confidential and for the analysis of the obtained data, each interview form was coded as P1 (Principal 1), P2 (Principal 2) ... P13 (Principal 13).

Keywords: Chaos, complexity, butterfly effect, fractals, feedback mechanisms, unusual attractors

Öz

Araştırmada okul yöneticilerine göre okullarda yaşanan kaos ve karmaşıklık durumlarının belirlenmesi amaçlanmıştır. Araştırmada, nitel araştırma yöntemlerinden durum çalışması deseni kullanılmıştır. Araştırmada; veriler nitel veri toplama araçlarından yarı yapılandırılmış görüşme yoluyla elde edilmiştir. Araştırmanın çalışma grubunun belirlenmesinde amaçlı örnekleme yöntemlerinden ölçüt örnekleme yöntemi kullanılmıştır. Araştırma verileri 2015-2016 eğitim öğretim yılında Düzce Merkez ilçede görev ve okul öncesi (3 müdür), ilkokul (3 müdür), ortaokul (3 müdür), meslek lisesi (2 okul müdürü) ve lise (3 okul müdürü) yapan toplam 13 okul müdüründen toplanmıştır. Veriler betimsel analiz tekniği ile çözümlenmiştir. Bu doğrultuda birbirine benzeyen veriler belirli kavramlar ve temalar çerçevesinde bir araya getirilmiş organize edilerek yorumlanmıştır. Katılımcıların ilgili görüşleri değiştirilmeden aktarılmıştır. Katılımcıların kimliklerinin gizli tutulmuş ve elde edilen verilerin çözümüne her görüşme formuna M1 (Müdür1), M2 (Müdür 2)... M13 (Müdür) şeklinde bir adlandırma yapılmıştır. Araştırmanın aktarılabilişliğini artırmak için araştırma süreci ve bu süreçte yapılanlar ayrıntılı bir şekilde açıklanmaya çalışılmıştır.

Anahtar Kelimeler: Kaos, karmaşıklık, kelebek etkisi, fraktallar, dönüt mekanizmaları, olağandışı çekiciler

Extended Abstract

Introduction, The foundations and assumptions of chaos theory are as follows: not being linear, butterfly effect (precise dependence on initial conditions), sensitivity to initial conditions, subsystems that carry all the features of the system (fractals), feedback mechanisms, systematic imbalance (turbulence), unpredictable patterns (unusual attractors). The school is a complex structure. School is not just a building in which people are located. To change the school, you have to think about the effect on all the parts of the change. Each piece is tied to other pieces and all pieces react to changes in any other piece. The Chaos Theory has begun to affect the social sciences and hence the educational work. How this interaction will occur is one of the questions that must be answered in order to bring a coherent solution to the problems that are being addressed in education. Through the present research, we tried to analyze the chaos and confusion experienced during school management processes. In the research, principals' chaos and complexity approaches and the potential reflection of these approaches on school management were studied.

Method, Case study design, one of the qualitative research methods, was used in the research. The data were obtained using semi-structured interview from qualitative data collection tools. The criterion sampling method, one of the purposeful sampling methods, was used to determine the study group of the research. Research data were collected from 13 principals working in preschool (3 principals), primary school (3 principals), middle school (3 principals), vocational high schools (2 principals) and high school (3 principals) in Duzce city center in 2015-2016 academic year.

Findings, In the research, the following themes were tried to be reached, nonlinear jobs (processes not based on cause-effect relations) in the schools, elements that give children delicate loyalty to the initial conditions (butterfly effect), the subsystems in the schools that carry all the features of the system (fractals), school feedback mechanisms, regular activities within the irregular activities of school and the schools' unpredictable patterns (unusual attractors).

Result, Non-linear work and processes (not based on cause-effect relationships) in schools: While bureaucratic procedures (incoming and outgoing document processing, additional courses, etc.) come to the forefront, these situations are followed by managerial and teacher performance measures, organization and coordination, planning, ordering and control processes, personnel management, creation of school budget, controlling the guard duty processes, boards and commissions. The fact that the subsystems in the school have the characteristics of the whole system (fractals): Democratic actions and accountability, all activities related to education and training (plans, events, total quality management, the fact that students in a class reflect all the characteristics of the teacher over time partnership in training plans and activities planned for the school, change of environmental conditions). School feedback mechanisms: These are school council activities, school development management team, sightseeing, unions, exhibitions, artistic and cultural activities, social assistance projects, physical structure changes, social activities, project teams, individual development-teaching activities, the introducing and infusing neighborhoods and parents into the school rules and individual rights, the clothes of pupils, support training and school rules. Regular activities in school irregular activities: school-based educational activities, school and classroom management, organizational and coordination stages, and task distribution for school staff. Physical appearance and behaviors of managers and teachers, creating charisma / influence, leadership, new changes and adaptation to them, the effect of syndicate views in administrative situations could emerge in planning, coordination and control phases and these are positive past experiences.

1. Problem Case

Chaos theory challenges people to cope with unpredictability and uncertainty in human behavior (Cziko, 1999). Complexity theory, on the other hand, has features such as completeness, emergence and feedback. This direction expands the theory of complexity, historical and political context and prediction (Agar, 1999). Chaos theory is considered as a part of physics and mathematics. It was a completely new term when it was used first. According to the chaos theory, chaos has sensitiveness to initial point. The sensitive dependence on initial conditions shows how a small change at one place or moment in a nonlinear system can result in large differences to a later state in the system. It is also known with "butterfly effect". Application of chaos theory into social sciences is still disputed and new for everyone. First of all, the term 'chaos' is known as turbulence and disorder. It may be found in nonlinear and dynamic systems (which are highly sensitive to their initial conditions). Due to its dynamic structure it has its own power to generate a change (Açıklın and Erçetin, 2012). The chaos approach presents a new administration paradigm for administrators. This paradigm is based on the assumption that even if everything is known, there is always something that is unknown (Erturk 2012).

The theory of complexity is already seen as a paradigm for natural sciences (Patton, 2014). While social scientists begin to understand assumptions, the theory of complexity about nonlinear dynamics can be a new paradigm for approaching human complexity. For this reason, in addition to the unpredictability and indeterminacy of areas such as students, teachers, administrators, education, education programs, schools and classroom management, the continuous change of human behavior can be considered in this context. In the information society, school has become a much more complex and interdisciplinary institution. The aims and functions of the school have changed and expectations have increased (Özdemir, 2014). The ability of the schools to reach their goals and meet the expectations made it possible for the school's sub-systems to work in harmony with each other (Şişman, 2012). Because schools are a group of anticipations and pressures of different groups (Açıklın, 1993). The school is the most important, critical and most effective of the subsystems in the education system. School management is a limited area of educational administration. The aims and structure of the education system are influenced by defining the boundaries of this area (Bursalıoğlu, 2002). Discussions on the existing school theories are focused on the point that the schools which have bureaucratic and hierarchical structures and constructed in a different way from life are inadequate to meet the needs of the students and the schools of the future are thought to be more information centered, synergistic and able to communicate better with their surroundings (Aydın, 2010). According to Sergioanni (2007), school theories should have the following characteristics: The bureaucratic role of individuals in schools should be abandoned by the thought that their position will determine their actions. Theories about the school should get its source from the school. School theory must be aesthetically pleasing. It should be constructed on the basis of idea-based and spiritual bonds. It should be a logical framework. The organization of the school should provide constructive teaching and curriculum-based decisions about the way it works, the curriculum and the classroom environment. It must make the school become a questioning center. Managers, teachers and students should be encouraged to manage themselves.

Considering the developments and changes in human rights, education, science and technology; In schools, elements such as distributive leadership, school autonomy or school-based management, student-centered education, and constructivist approach need to be reorganized. At this point, the elements should be adapted to the following functions: school, management, planning, implementation, teaching process and evaluation. Therefore, the roles, duties, authorities and responsibilities of the students, teachers, principals and school stakeholders should be reconsidered.

The definition of education varies with the impact of globalization and social change. In this context, education is beginning to be perceived as a lifelong process, and it is important for individuals to learn how to learn a lot of information. This situation leads to the question of the effect of the school on student learning and the grounds for discussing alternative learning environments. The increasing importance of skills such as critical thinking, communication, exploitation of differences, problem solving, managing conflicts, looking at events from different angles, and interpreting daily events and social events taking place in a wider context are all increasingly making necessary to think concepts such as school, education, student, teacher. With the basic paradigmatic changes in 21st century education, a student-centered understanding is adopted, more freedom is provided to the students, all learners are accepted to be able to learn and education is seen to be more universal (Özdemir and Kılıç, 2014).

The paradigm shifts that began in the midcentury, but concentrated in the last quarter of the past, were the birth of new perspectives on the nature of knowledge, humanity and the universe. These multipliers have brought

about new quests in the differentiation, structuring and functioning of educational institutions, which make people and workers a kind of information workers. However, in order for these changes to be properly adapted to the educational system, the educational system of the new paradigms needs to be interpreted within its own independent structure. According to the prevailing understanding of post-positivism, scientific truths and judgments are not absolute. Scientific knowledge is only one of the possible species as well as the last point reached. According to the prevailing understanding after positivism, knowledge is a social formation. People do not take it as it is, but make sense to them. That is, people are active in the formation of their own knowledge and their truths. Therefore, education should be organized to produce information instead of transferring it. Contrary to positivist philosophy, people have truths, not only a truth. The individual follows a unique path to creating his own truths and reaching the truth. This is due to his personality in the perception and interpretation process. Instead of dogmatizing the laws of the universe under the great theories in the understanding that follows positivism, it adopts to maintain the "real search" with an understanding of many truths (Özden, 2006).

Today, different perspectives of reality, science and scientific process differ. Postmodernism has a philosophical point of view which argues that reality is a phenomenon consisting of heterogeneous, fragmented, irregular, and diverse (Keskin, Akgün and Koçoğlu, 2016). The conservative paradigm concentrates on "the process of how any social reality is developing and sustaining". The purpose of creating the theory is to explain the events. For this reason, organizational processes are also explained. The researcher with this point of view collects data from interested persons. The analysis continues throughout the process of collecting data (Gioia and Pitre, 1990, Beycioğlu, Kesik and Kondakçı, 2014). The interpreter paradigm has adopted long-term observation and indepth investigation as a research method (Şişman, 1998). Chaos theory has revealed that organizations should be perceived as organisms living in complex relations, not machines. Chaos is that nonlinear and deterministic dynamical systems produce results that are overly sensitive to initial values with irregular and unpredictable behavior. The complexity is that the system components are interacting with each other and with the elements of their surroundings in a nonlinear relationship with the initial values (Koçel, 2007).

According to Gleick (1987, cited in Patton, 2014), the foundations and assumptions of chaos theory are as follows. Not being linear; Not to rely on cause and effect relation (non-linearity); a simple cause and effect relation arises in a linear system. A causes B, which leads to C. A chaotic system is not linear. A nonlinear system is similar to bowling. When a ball is rounded to a series of prime, countless variables arises and interact with one another. In school development efforts, despite linear organizational schemes and development plans, schools are not linear systems; chaotic systems. This leads to the fact that schools will not be ruled from the top (Glickman, Gordon and Ross, 2014).

Butterfly effect (precise dependence on initial conditions), sensitivity to initial conditions (butterfly effect); this phenomenon is known as an addiction sensitive to initial conditions. This means that a small, seemingly unconnected event that occurs in one part of a system can have a great effect on other parts of the system. A consequence of addiction that is sensitive to the initial conditions is the inability to estimate that a chaotic system will come in the long run. It is impossible to predict long-term effects on school development. This means planning is needed for another route. In schools, plans must be shortlived (1-2 years) rather than long-term (5-10 years) and focused on process rather than product (Patterson, Purkey and Parker, 1986 cited in Glickman, Gordon and Ross, 2014). A complicated system can cause confusion and at the same time cause inconsistency simple systems can reveal complex things. On a collective and personal scale, chaos develops in different forms of thought and for different reasons.

Sub-systems carry all the features of the system (fractals), system and complexity are often closely related to each other. For example, self-organization of systems as the focal point of complexity theory means that the development of the organization or organization is maintained at a certain level (Rhee, 2000). Fractal is a geometric shape that resembles itself on different scales (Gleick, 2008). In complex social systems, they show similarities on different scales: organization and culture are seen at all levels of certain patterns of system. Like the fractals in the world, schools also show similarities at different scales (Glickman, Gordon and Ross, 2014). Properties of the fractals (Peitgen and Richter, 1986) Even the smallest detail carries all the features of the whole. Each piece is a smaller part of the whole that looks like itself. This feature is called "self-similarity".

Feedback Mechanisms, chaotic systems include feedback loops that allow output to rotate as input. There is also a need to establish and maintain feedback mechanisms in school systems. Feedback can be in the form of student performance (performance), student outcomes, quality circles. The feedback mechanism helps managers to achieve success in achieving their goals. Without this mechanism, it will not be possible to understand how much

the targets are achieved. There are two types of feedback for open systems in complex structures; positive and more common negative feedback. The positive feedback increases the degree of variance or deviation from the predetermined standard or targets, while the negative feedback provides stability by returning the system to predetermined standards; thus encouraging the system to change. In fact, information on the system output can be interpreted as negative or positive feedback depending on the situation. If this information leads to maintaining the system with a predetermined target, the negative feedback is the issue; there is a positive feedback if it is directed towards changing or improving the structure of the target or system (Dereli, 1981).

Systematic imbalance (turbulence), turbulence can be caused by defects in or out of a system. As the system becomes more complex, it may be subject to more imbalance due to turbulence. All complex systems experience turbulence. However, too much turbulence (outside or in the school) can lead to fragmentation of school development efforts (Glickman, Gordon, Ross, 2014).

Unpredictable patterns (unusual attractors), chaotic systems have extremely complex and unpredictable patterns. In the chaotic system, unusual distractors are deeply coded. According to Keedy (1995' cited in Glickman, Gordon and Ross, 2014). An unusual attractor in schools are attractive, student-centered education or leaders.

According to Boyd (1992), the school is a complex structure. School is not just a building in which people are located. To change the school, you have to think about the effect on all the parts of the change. Each piece is tied to other pieces and all pieces react to changes in any other piece. The Chaos Theory has begun to affect the social sciences and hence the educational work. How this interaction will occur is one of the questions that must be answered in order to bring a coherent solution to the problems that are being addressed in education. Through the present research, we tried to analyze the chaos and confusion experienced during school governance processes.

Akmansoy's (2013) study found traces of butterfly effect in educational organizations, and a minor disruption in the educational process was found to be effective in creating a bigger problem in the following years. Based on the results of the research, it can be solved early in the educational environment by taking forward the first signals of the butterfly effect. According to him, the disorder caused by chaos in education should not frighten the educators, but this disorder can be turned into an opportunity to establish a new order and reorganize to adapt to this new situation. It is also necessary to recognize that systematic, planned and regular operations and practices and projections as well as unforeseen, irregularities and coincidences are inevitable within the organizational structure and operations. As a matter of fact, in the study conducted by Usta (2013), it was determined that the adoption of positivist and chaos management approaches by the principals influenced their and their teachers' organizational commitment levels. Because, unforeseen, unplanned and irregular situations are inevitable in school organizations. It is important that education organizations and schools operating in an environment where chaos is experienced can maintain their existence and compete. Therefore, purpose of the research; principals' chaos and complexity approaches, and the potential reflection of these approaches on school management.

2. Method

Model of the Research

In the research, case study pattern was used as a qualitative research method. The case study is a method predominantly characterized by qualitative research methods and allows for an indepth study of the investigated subject. It is a preferred method of understanding various subjects of education especially when asked the questions what, how and why. (Çepni, 2012; Yin 2003, Yıldırım and Şimşek, 2005; Yilmaz, 2015). In the study, the situation discussed; The perceptions of the chaos and confusion experienced by the principals in the school management process and the reflections of this on school administration.

Instrumentation

In the study; data were collected through interviews with qualitative data collection tools. Investigations by the researchers were used to collect the data and a semi-structured interview form consisting of 16 questions about the chaos and complexity situation reflecting on the administration situations was used which is come into being with the help of 11 educators taking master degree in the field of Planning and Supervision of Educational Administration Supervision and Economics as well as principals, deputy principals and teachers in their schools. Semi-structured interview form was given to the form by performing a preapplication to 7 students from the same graduate student group and the following open-ended questions were determined.

- 1) *What tasks and procedures do you find in the school complex? why?*
- 2) *Which nonlinear / mutual causality principle and multiple cause-multiple conclusions are in school?*
- 3) *Which activities are predictable in the school (what are the unforeseen circumstances)?*
- 4) *What activities' interaction in the school are the situationally rather than the causal?*
- 5) *Which small decisions and actions in school cause what kind of big consequences ?*
- 6) *Which activities in the school are sensitive to initial situations? (what are the initial states of delicate commitment?)*
- 7) *Which jobs and processes in the school are self-organizing and self-renewing?*
- 8) *What arrangements and activities in the school are holographic (everything is linked and each piece of knowledge is carried over)?*
- 9) *Which jobs and transactions are seen at all levels and in all units?*
- 10) *Which jobs and processes in the school depend on the others, and all areas reacting to changes in any other areas?*
- 11) *What applications, decisions, and stakeholders (educators, parents, unions, school environment, etc.) are taken in the school?*
- 12) *What / what kind of feedback mechanisms are there in the school?*
- 13) *What activities, products, and processes are focused in the school?*
- 14) *In which irregular activities is the school organized?*
- 15) *Which activities in the school are experiencing deterioration / imbalance?*
- 16) *What activities in the school are unusual / odd attractors seen?*

Participants

For the study group of the study, criteria sampling method under was employed purposeful sampling methods. The criterion of being a school principal in the survey and at least one year of education (in terms of duty awareness) was taken into account. Research data were obtained from 13 school principals in Düzce Central District in the year 2015-2016 who were in charge of pre-school (3 principals) and primary school (3 principals), secondary school (3 principals), vocational high school (2 school principals) and high school (3 school principals). The interviews were held between 45-60 minutes with each principal. 5 of the study group were female and 8 were female. Training years vary from three years to twentyfive years.

Data Analysis

The data were analyzed by descriptive analysis technique. The data collected in the descriptive analysis are summarized and interpreted according to the previously determined theme. The data can be organized according to the theme presented by the research questions or by considering the questions or dimensions used in the interview and observation processes (Yıldırım and Şimşek, 2008). In this direction, similar data are organized and interpreted in the context of certain concepts and themes. The relevant views of the participants have been passed unchanged. The identities of the participants were kept confidential and the solution of the obtained data was made in each interview form by naming M1 (Manager1), M2 (Manager2) ... M13 (Manager). In order to increase the transferability of the investigator, the research process and the structures in this process have been tried to be explained in detail. In order to find the internal consistency of the study, all of the findings were given. The following theme has been tried to be reached in the research.

- 1- Not to be based on cause-effect relation (non-linear)
- 2- Sensitivity to initial conditions (butterfly effect)
- 3- Sub-systems carry all the features of the system (fractals)
- 4- Feedback Mechanisms
- 5- Systematic imbalance (turbulence)
- 6- Unpredictable patterns (unusual attractors)

3. Findings

The themes related to chaos and complexity, distribution of sub-items related to the sub-areas of the themes are given in the following tables.

1. Not to rely on the cause-effect relationship (non-linear)

Reflection of non-linearity on school management processes

a) Complicated / complex

Administrative and teacher performance criteria, Organization and coordination, Planning, ordering and controlling processes, personnel management, bureaucratic procedures (incoming-outgoing documents, operations such as additional courses), formation of school budget, monitoring of guarding proceedings, committees and councils, Direct citations of principals about the complicated/complex situations that are reflected on school management processes are given below:

"I find performance criteria complex. Because currently there are no performance measures in the context of management for principals within the Ministry of National Education." (P1).

"Something complicated and complex consists of multiple parts and is a whole that these parts are interconnected and related. Organization and coordination are complicated and complex processes. Because the work and procedures in these processes directly affect one another." (P2).

"Personnel management is a complex process. Because people have different needs and want all of them to be taken into account" (P4).

"The school has many complex processes in order to be able to maintain its existence, and to be able to have the features of an institution. These include incoming-outgoing bureaucratic procedures and additional lessons" (P5).

"Preparing plans ve programs, formation of the school budget, monitoring the guarding procedures" (P6).

"... some decisions are taken by the executive committees, groups, student representatives, rather than by the principal..." (P8).

Non-linear situations that include the mutual causality principle and multiple reasons-multiple results understanding;

b) Non-linear situation involving the understanding of mutual causation and multiple reason-results

Accountability, performance, total quality items, communication, school inputs and products, personnel management, social relationships between staff and educators, Open system. Direct citations of principals' views are given below:

"Accountability, performance, total quality items" (P1).

"There is the principle of mutual causality in personnel management. Because meeting the demands and needs of the staff brings happiness and institutional efficiency" (P4).

"Everything is carried out according to a certain plan and program in school. There is also a causality in the attitude of the teacher to the principal, the teacher to the student and the student to the teacher." (P5).

"There is a causal relationship between the principal and the teacher, between the teacher and the teacher, the students." (P6).

"...school is an open system. It is also intertwined with the sub-systems according to the interactions with them. It takes students from the society, takes culture, gives back to the society by equipping the student, also individualizing and socializing them. As you can see, there is even a causality in the basic purpose of the school." (P7).

"There is a mutual causality relationship between openness and accountability" (P8).

c) Predictability is limited (unforeseen circumstances)

The school principal's inability to choose a teacher, decision-making and planning, incidents that can not be prevented in school and class, injuries, disasters (fire, flood, earthquake etc.), educational activities, the student behaviors, localness. There are some direct citations of the principals related to this topic:

"The school head cannot choose a teacher and cannot determine their own stakeholders. If the school management can choose their own teacher, they can make educational activities more efficient." (P1).

"Predictability in educational activities is limited" (P4).

"Accidents, natural disasters may not be foreseen. The teacher should be particularly careful in controlling students' attitudes" (P5).

"Routine educational activities can be foreseen. Accident, injury, natural disasters are unpredictable"(P6).

d) Interaction is situational rather than causal

School-parent association activities in school, decision making stages based on sociocultural differences, inclass and schoolwide activities and behaviors, school and classroom management (each school and class has different people and climate), human relations. There are some direct citations of the principals related to this topic:

"I think school-family union activities in school are situational" (P1).

"The facilities and the cultural background of each school are different. Therefore, these differences should be taken into consideration in the decision-making phase. " (P2).

"Students exhibit a different attitude towards each teacher in the classroom. This means that each classroom management is situational. Teachers and principals behave differently according to conditions and people" (P5).

"The teacher's approach to different principals is situational. Each principal has a different attitude"(P6).

2. Sensivity to initial conditions (Butterfly effect)

Causing butterfly effect in schools

a) The fact that very small decisions have very big results.

Very small decisions and actions in schools that have great consequences; all elements of school management, decision making and planning process, decisions taken in council meetings, exams and exam achievements, knowledge and skills that are taught incorrectly or correctly, the remarks and explanations of directors. Some direct citations of the principals related to this topic are given below:

"In all aspects of school management, all kinds of decisions and actions can have very big consequences" (P1).

"It is decision making, planning process; Because some situations that we cannot foresee in the decision making and planning process may cause big problems. " (P2).

"Sometimes small test achievements can be a big success in education situations" (P4).

"Anything small or big in school can have positive or negative consequences. Any information taught incorrectly by the teacher may affect the student's life. Likewise, a positive situation in which a student is taught in behavior can make him a very successful and respected person in life." (P5).

"Teachers regard principals as legitimate power and can derive different meanings about themselves from the each word that the principals say. Therefore, principals should be careful for what they say"(P6).

b) Demonstrating commitment with sensitivity to initial situations (Precise commitment shown in initial cases)

Elements that are sensitive to initial situations in schools; being scheduled and democratic in all processes, decision making and planning process, precise commitment between teacher-student and teacher-principal, activities related to ethical rules and laws, professional happiness, corporate culture. Sample direct citations of the principals related to this topic are given below

"Activities related to ethical rules and laws demonstrate strong commitment to the initial situations" (P4).

"The teaching profession is a profession which must be loved and desired. This is the sensitive commitment of the person with the profession." (P5).

"Professional happiness is also important for educators as in any profession. Adopting the corporate culture will prevent negativities"(P6).

3. The sub-systems have the characteristics of the whole system (fractals)

Fractals reflected in school management processes

a) Self-organizing and self-renewing work and processes in schools

Total quality management processes and applications, management, communication, influence and coordination, original projects in the scope of research and development activities in school, social activities, public relations, solving school problems, to follow and adapt the changes, adaptation to technological innovations. Some direct citations of principals on this topic are as follows:

“Original projects under the scope of research and development activities in the school are renewing both teacher and student profile and in the project process, there is a spontaneous organization within the institution.” (P3).

“Social activities and public relations can organize themselves.” (P4).

“If the school is able to solve its problems without external support, it is able to organize itself. If it can adapt the changes made within the system, that means it can renew itself.” (P5).

“The school should be able to follow new educational developments, technology and solve problems with its own stakeholders.”(P6).

b) Holographic arrangements and activities in schools (each is connected and each piece carries the knowledge of the whole); internal communication, all managerial processes, integration of a concept and behavior to be taught to the students with other courses, communication and human relations, supplied course observations, support of managerial affairs, decisions taken in the school disciplinary board. Some direct citations of principals on this topic are given below:

“With the help of inschool communication, the school could act together and take action.” (P1).

“From time to time, teachers can gain an understanding of teaching a new lesson by doing managerial tasks or by entering each other's lessons.” (P5).

“For example, the topics discussed and decided on the school disciplinary committee are holographic in terms of parents and environment”(P6).

c) Work and processes at every level and every unit of schools;

Democratic actions and accountability mechanism, total quality management, the students in a class reflect the characteristics of their teachers over time, the educational plans and partnerships in the planned activities related to the school, change of environmental conditions, all educational work (plans, activities). Some direct citations of principals' views on this topic are given below:

“Democratic actions and the accountability mechanism can be seen in the units of student-teacher and teacher-manager. Total quality management is binding in all areas and is seen in all units of the school” (P1).

“There is a plan and order in every level and every program. However, sometimes there may be flexibility depending on environmental conditions” (P5).

“All studies, plans, activities, experiments, visuals etc. can be seen in each unit and in each level”(P6).

“Participation occurs at all levels and in each unit”(P8).

d) Work and processes in schools that are dependent on others and react to any changes in all areas;

Democraticism, pluralism, openness, the teacher-parents-staff-school-teacher and students are connected to each other in school, the planned acquisition is linked to all educational activities and student responses differ when it comes to changes, profession in the field, raising awareness to the values, all acquisitions and educational activities. Some direct citations of principals' views on this topic are given below:

“The management understanding cannot be applied in school unless democracy, pluralism and openness processes are not thoroughly efficient” (P1).

“The duty of the principal and the teacher in the school is to transfer the knowledge in the field. They should also raise awareness about values ” (P5).

“all behaviors / achievements that are desired to be gained by the student trigger each other and are interdependent. For example, respect, no harm to others, environment, equipment protection”(P6).

"...to give an example from the school level; children are trained in 5 areas of development (language, cognitive, social-emotional, motor, self-care). The fields to be acquired are fully connected. There is no activity for a single area. One influences the other"(P7).

4- Feedback Mechanisms

Feedback mechanisms reflected in school management processes

a) Participation in the decision

Decisions taken with the participation of relevant stakeholders (educators, families, unions, school environment, etc.); school-family association activities, school development management team, trips, trade union, exhibition, artistic, cultural activities, social assistance projects, physical structure changes, social activities, project teams, individual development-learning activities, personal rights of individuals, student costumes, outfit, support training, school rules, introduction of the aims of the school to the environment and parents. Direct citations of principals' views on this topic are given below:

"Opinions of other stakeholders about school-family union activities, school development management team, trips, trade union activities, project teams, individual development-teaching activities are taken into consideration" (P1).

"Students' outfits, support training, school rules" (P4).

"Stakeholders should be involved in artistic, cultural or school activities, such as seminars and courses." (P5).

"Introducing the school's aims to the environment and parents, adopting the environment will affect the view and contribution positively." (P6).

b) Feedback mechanisms that schools use;

Communication, achievements, control, evaluation process, teachers' evaluation of the school year, positive behavior changes and parent interviews, midterm exam results, job placement rates, working hours of staff, evaluation of student achievements, meetings, exhibitions, gratification surveys. Some of the direct citations of principals' views on this topic are given below:

"Communication, achievements (rewards etc.)" (P1).

"The mechanisms of feedback vary depending on the types of schools. Center exam results, job placement rates, staff working hours are feedback mechanisms" (P4).

"All activities at school and in the classroom are process-oriented. Students' achievements are evaluated over time" (P5).

"Gratification surveys are conducted with the participation of all students, parents, teachers and staff by the school development team in February and June. By doing this, it is aimed to obtain feedback on to what extend the work has been adopted by the teachers, students, parents and environment."(P8).

c) Process-based activities in schools,

All educational and managerial activities in school, all managerial processes from decision stage to control stage, all concepts and behaviors to be taught to the students and all educational activities, educational activities. Some of the direct citations of principals' views on this topic are given below:

"All educational and managerial activities in school are process-based, not product-based" (P1).

"The results are not important in educational activities. In these activities, students' cognitive and psychomotor skills gain more importance" (P4).

5. Systemic imbalance (turbulence)

Turbulence situations reflected on school management processes

a) Regular activities within the irregular activities in schools

Situations in which there are regular activities within irregular activities; educational activities at school, stage of organization and coordination, distribution of tasks for school personnel and school units, school and classroom management. Some of the direct citations of principals' views on this topic are given below:

"There is a scheme of everything in school and class. Work is carried out in a certain order even if they look messy" (P5).

"There is an order in class and school"(P6).

"Education system is a great one. Non-governmental organizations, although not a direct member of this system, are indirectly involved in the major education system through training activities in their fields of activity. These are the independent and irregular education activities."(P8).

b) Situations where distortion and imbalance are experienced;

Total quality management, very frequent and unsuitable changes in the education system made by top management, educational environment where teachers and students are dominant, different perceptions among teachers about their freedom of attire, inadequate professional development of teachers, inadequate teacher-student-manager communication, lack of supervision and communication, environmental factors. Some of the direct citations of principals' views on this topic are given below:

"The low level of professional development of teachers in educational institutions is contrary to an innovative education system. Therefore, this situation causes deterioration in education and classicization, and negatively affects parent-teacher-student-manager communication. Imbalances may occur in these places" (P3).

"In every stage of education, corruption takes place. It can be experienced between the teacher and the manager. This may have negative effects. Communication and quality may be impaired due to lack of supervision" (P5).

"Environmental factors of the schools may cause distortions, such as children's relationships with their peers, their perceptions of the teachers"(P6).

6. Unforeseen patterns (unusual factors)

Unusual factors reflected in school management processes

a) Unforeseen/ unusual factors in schools.

Unforeseen/ unusual factors (for example, formal and informal leaders among educators and students, subjects/areas of popular interest in school management). efficiency of trade union views in managerial situations, the fact that principals and teachers create charisma, influence, leadership with their appearance and behaviours, planning, coordination and control stage, new changes and adaptation, positive past experiences. Some of the direct citations of principals' views on this topic are given below:

"Trade union views are effective in managerial situations" (P1).

"The importance and impact of a very small situation at any time in school or class may increase. Problems can be solved by adapting to new conditions" (P5).

"Linking past experiences with new knowledge and skills, empathizing with other people"(P6).

"Leadership is an unusual factor in management. Because the responsible attitude and behavior of the leader has a positive contribution to the adoption of that group's responsibilities"(P8).

4. Results

The following results have been achieved with the present research.

Non-linear work and processes (not based on cause-effect relationships) in schools: While bureaucratic procedures (incoming and outgoing document processing, additional courses, etc.) come to the forefront, these situations are followed by managerial and teacher performance measures, organization and coordination, planning, ordering and control processes, personnel management, creation of school budget, controlling the guard duty processes, boards and commissions. These include the managerial and teacher performance measures, organization and coordination, planning, ordering and control processes, personnel management, school budget creation, associations, boards and commissions. Among employees/trainers (social relationships), communication, accountability, performance, total quality elements, school input and products, personnel management. These are unwinding accidents in class and school, injuries, disaster situations, inability of principal to choose teacher, decision making and planning, educational activities, student behaviors and locality. These are classroom and school-wide

activities and behaviors, school council activities, school and classroom management (person and climate in each school and classroom are different from each other), the school environment, the decision-making processes that depend on socio-cultural diversity, human relationships. This situation gives rise to the fact that Glickman, Gordon, Ross (2014) states that schools will not be governed from the top. It should be noted that school-based, schoolbased, school-based arrangements should be made and the authorities and responsibilities of the central government on schools should be transferred to the school management and school stakeholders.

Elements that cause delicate loyalty to the initial conditions (causing butterfly effect) in schools: These are decision making, planning process, wrong or correctly taught knowledge and skills, management's discourse and explanations, all elements of school management, decisions taken at board meetings, examinations and examination successes in educational situations as well as professional love, being planned and democratic in all processes, decision-making and planning, sensitive loyalty between teacher and student, teacher-manager, activities that concern ethical rules and laws, corporate culture. Current results are in parallel with the results of Akman-soy's (2013) research. Akmansoy also found traces of the butterfly effect in educational organizations and found that a minor disruption in the education process was effective in creating a bigger problem in later years. These situations mean that a small and seemingly disconnected event that occurs in the educational system and therefore in a part of the school system can have a great impact on other parts of the system. In parallel to what Patterson, Purkey and Parker (1986, cited in Glickman, Gordon, Ross, 2014), the plans in schools in the Turkish education system should be long-term but short-term and more focused on the process than on the product.

The fact that the sub-systems in the school have the characteristics of the whole system (fractals): These are total quality management processes and practices, organization, communication, effect and coordination, original projects made in the scope of research and development activities in the school, social activities, public relations, solving the problems of school in itself, followup and adaptation to the changes, harmonizing with ecological innovations as well as the stages of the acquisition of pupils, the communication within the school, the whole management process, the communication and human relations, the mutual course observations of the teachers, the support for the administrative work, the decisions made in the school discipline committee. Democratic actions and accountability, all activities related to education and training (plans, events, total quality management, the fact that students in a class reflect all the characteristics of the teacher over time, partnership in training plans and activities planned for the school, change of environmental conditions).

As can be seen above, the schools are complex in Boyd (1992) and Glickman, Gordon and Ross (2014). As a matter of fact, the school system has become more complex due to the excessive and continuous variability of internal and external environmental factors. This situation may expose schools to more imbalance. In order to prevent this situation from causing the possibility of fragmentation of school development efforts, it should be ensured that the upper and lower systems are compatible and work in a way. School feedback mechanisms: These are school council activities, school development management team, sightseeing, unions, exhibitions, artistic and cultural activities, social assistance projects, physical structure changes, social activities, project teams, individual development-teaching activities, the introducing and infusing neighborhoods and parents into the school rules and individual rights, the clothes of pupils, support training and school rules. The results obtained indicate that chaotic systems cover the feedback loops that allow the outputs to return to the system as inputs, and that the feedback mechanisms in school systems need to be established and maintained (Dereli, 1981). The use of multiple evaluation mechanisms in the school system can be interpreted as increasing the validity and reliability of the measurement tools and, consequently, increasing the quality of education.

These are the results of central examinations, occupation rates, staff working hours, communication, achievement, control and evaluation process, evaluation of teachers' educational year, changes in positive behaviors of students and parental interviews, meetings to evaluate student achievements, exhibitions and satisfaction surveys. These are also all educational activities, education and training activities, all educational and administrative activities in the school, all management processes from the decision-making stage to the control stage, every concept and behavior desired to be given to the students in the school.

Regular activities in school irregular activities: School-based educational activities, school and classroom management, organizational and coordination stages, and task distribution for school staff. Situations in which schools experience deterioration-imbalance; The inadequacy of parent-teacher-student-manager communication, the times when total quality management is not applied, very frequent and unfavorable changes in the education system made by senior management, an educational environment in which parents and students are dominant and

teachers cannot work freely, different perceptions of teachers' freedom of dress, inadequacy of teachers' professional development, lack of control and communication, and environmental factors.

Unforeseen patterns of schooling (unusual attractiveness): Physical appearance and behaviors of managers and teachers, creating charisma / influence, leadership, new changes and adaptation to them, the effect of syndicate views in administrative situations could emerge in planning, coordination and control phases and these are positive past experiences. It is seen that there are educational leaders and principals, as mentioned in the non-interest schools of the Turkish educational system (Kifty, 1995; cited in Glickman, Gordon and Ross, 2014). Therefore, schools should take priority over student-centered education.

5. References

- Açıklan S. N. & Erçetin Ş. (2012) *Great illusion in twenty-first century-chaos knocking door*. Santo Banerjee, Şefika Şule Erçetin (Eds), Chaos, complexity and leadership springer proceeding in compexity. Springer Dordrecht Heidelberg New York London, pp 1–9. <http://www.springer.com/series/11637>.
- Açıklan, Ş. (1993). Öğretmenlerin okul müdürlerini etkileme güçleri. *H. Ü. Eğitim Fakültesi Dergisi*, (9), 183-192.
- Agar, M. (1999). Complexity theory: An Exporation and Overview. *Field Methods*, 11(2), 99-120.
- Akmansoy, V. (2013). *Kaos Teorisi ve Eğitime Yansımaları (Mehmet Akif Ersoy Üniversitesi Örneği)*. Eğitim Yönetimi, Teftişi, Planlaması ve Ekonomisi Bilim Dalı. Mehmet Akif Ersoy Üniversitesi, Eğitim Bilimleri Enstitüsü. Yayınlanmamış Yüksek Lisans Tez. Burdur.
- Altun, S. A. (2001). Kaos ve yönetim. *Kuram ve Uygulamada Eğitim Yönetimi*, 28, 451-469
- Aydın, İ. (2010). *Alternatif okullar*. (3. Baskı,) Ankara: Pegem A Yayıncılık
- Benson, G.D. & Hunter W. J. (1992). Chaos theory: no strange attractor in teacher education. *Action in Teacher Education*. XLV, 60-67.
- Beycioğlu, K., Kesik, F. & Kondakçı, Y. (2014). *Eğitim yönetiminde güncel tartışmalar*. Eğitim yönetimi (Editör: Selahattin Turan). Ankara: Pegem Akademi.
- Boyd, V. (1992). *School context: Bridge or barrer to change?* Austin, TX: Southwest Educational Devalopment Lab.
- Bursalioğlu, Z. (2002). *Okul yönetiminde yeni yapı ve davranış*. Ankara: Pegem A Yayıncılık, No.9
- Cziko, G. A. (1999). Unpredictability and indeterminism in human behaviour. Arguments And Implications For Educational Research. *Educational Researcher*, 17-25.
- Çobanoğlu, F. (2008). Değişim mantığını anlamak: akış ve dönüşüm olarak örgüt. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, 23, 110-119.
- Dereli, T. (1981). *Organizasyonlarda davranış*. İstanbul: Ar Yayın Dağıtım.
- Erçetin, Ş. (2001). *Yönetimde yeni yaklaşımlar*. Ankara: Nobel Yayın Dağıtım.
- Ertürk A. (2012) Kaos kuramı: yönetim ve eğitimdeki yansımaları. *Kastamonu Eğitim Dergisi* 20(3), 849–868.
- Gleick, J. (1987). *Chaos; making a new science*. New York: Penguin.
- Glickman, C. D., Gordon, S.P. & Ross, J. M. (2014). *Denetim ve öğretimsel liderlik* (Çeviri Editörleri: Mualla Bilgin Aksu, Esmahan Ağaoğlu). Ankara: Anı Yayıncılık.
- Koçel, T. (2007). *İşletme yöneticiliği*. İstanbul: Ankan Matbaası.
- Özdemir S. & Kılıç, A. Ç. (2014). *Değişen toplum ve okul*. Türk Eğitim Sistemi ve Okul Yönetimi. (Editör: Servet Özdemir). Ankara: Pegem Akademi.
- Özdemir, S. (2014). *Türk eğitim sistemi ve okul yönetimi*. (3. Baskı,) Ankara: Pegem A Yayıncılık.
- Özden, Y. (2006). *Okul yönetimlerini geliştirme programı*. MEB. Ankara: İlköğretim Genel Müdürlüğü.
- Patton, M. Q. (2014). *Nitel araştırma ve değerlendirme yöntemleri* (Çeviri Editörleri, Mesut Bütün, Selçuk Beşir Demir). Ankara, Pegem Akademi.
- Peitgen, H. & Richter, P. (1986). *The Beauty of Fractals*. Heidelberg: Springer-Verlag

-
- Pryor, R. G. L. & Bright, J. E. H. (2005). Chaos in practice: Techniques for career counselor. *Australian Journal of Career Development*, 14(1), 18-28.
- Savacı, F. A. (2006). Kaos ve hoşgörölü fraktal geometri. *Bilim ve Ütopya Dergisi*, 149, 36-38.
- Sergiovanni, T. J. (2007). *Rethinking leadership. A collection of articles*. Thousands Oaks. California: Corwin.
- Şişman, M. (1998). Postmodernizm tartışmaları ve örgüt kuramındaki yansımaları. *Kuram ve Uygulamada Eğitim Yönetimi*, 2(3) 451-464.
- Şişman, M. (2012). *Türk eğitim sistemi ve okul yönetimi*. (5. Baskı,) Ankara: Pegem A Yayıncılık.
- Töremen, F. (2000). Kaos teorisi ve eğitim yöneticisinin rolü. *Kuram ve Uygulamada Eğitim Yönetimi*, 1(22), 203-219.
- Usta, M. E. (2013). *Okul Yöneticilerinin Pozitivist ve Kaos Yönetim Anlayışlarını Benimsemelerinin Kendilerinin ve Öğretmenlerin Örgütsel Bağlılık Düzeylerine Etkileri*. Yayınlanmamış Doktora Tezi, Fırat Üniversitesi Eğitim Bilimleri Enstitüsü. Elazığ.