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Using Electronic Services Provided by the Ministry of National Education as a Decision Support System: A Grounded Theory Study*

Tayfun YORUK** Ilhan GUNBAYİ***

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Abstract: This study aims to put forward a theory for transforming electronic services provided by the Ministry of National Education and used in the schools into decision support systems within the scope of management information systems. This study is a theoretical study based on qualitative research methods using the interpretive paradigm. School administrators, psychological counselors, and guidance counselors make up the research group on the premise that it is voluntary.In the research, semi-structured interview forms were used as a data collection tool, the answers of the participants were recorded on a voice recorder, the recordings were analyzed and transcribed. Themes were obtained by applying open, axial, and selective coding, which are the steps of theory studies based on content analysis, using the NVivo 10.0 program on the obtained transcripts. In the light of these themes, a general model has been obtained explaining the transformation of management information systems into decision support systems. When the findings were examined, it was seen that the model obtained was similar to the open system theory. Accordingly, "Effective User Interface", "Collective Participation Based Monitoring System" and "Statistical Reporting", which correspond to the elements of open system theory, form the basis of the decision support system model to be applied in schools.

Keywords: Decision support systems, grounded theory, educational technologies

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** *Corresponding Author*: Akdeniz University, Turkey, tayfun@akdeniz.edu.tr

*** Akdeniz University, Turkey, igunbayi@akdeniz.edu.tr

Introduction

The management approach of our age is based on evaluating the organizational environment and its elements and making predictions, in other words, strategic management. In this way, institutions are not caught unprepared in matters such as how they will operate and take precautions against possible or sudden problems (Uzun, 2000). At this point, it is possible to say that managers need consistent, accurate, reliable, and objective information to take strategically important decisions.

Today, the existence of organizations in their fields of activity and their success in these fields are most closely related to how successful they are in creating, using, and utilizing information (Iraz & Zerenler, 2008). Information, vital for organizations, is an indispensable resource for organizational planning and control (Anderson, 1979). Because there is a linear relationship between "corporate planning" and "institutional effectiveness", it can be argued that there is a positive correlation between "knowledge" and "institutional effectiveness" (Simsek & Ogut, 1998). In other words, it can be claimed that effective information supply and management is an indispensable prerequisite for effective institutional functioning (Ogut, 2012).

In addition to the importance of information in the field of management, accurate information and the role of this correct information in decision making in management processes are of great importance to managers. Today's managers are aware of what the correct use of information in the decision-making process brings to the organizations or institutions in their competitive environment.This is why; Today's managers accelerate the achievement of strategic goals of organizations or institutions by investing in information technologies (Arslan & Yılmaz, 2010). According to McCamy (1947), although decision making forms the basis of management, the quality of the process is also reflected in the decision making. However, all elements of the management process are dependent on, surrounded by, and intertwined with decision making. In short, these items exist for decision-making (Aydin, 2010). According to Bursalioglu (2002), decision-making is an action in which the essence of management and other processes are in constant relationship. The continuity of the organization depends on the accuracy of the decisions made. For this reason, managers should be knowledgeable about both the models and stages of the process to be able to make correct and appropriate decisions. They should especially consider this process more than other processes (Bursalioglu, 2002).

Several instruments are used in organizations to facilitate the decision-making action and process. It is possible to say that management information systems and decision support systems (DSS) are among the main instruments. It is possible to come across many definitions in the literature regarding these two concepts, which can often be confused with each other. Kreitner (1983), while describing management information systems, stated that it is a computer-based network that collects, processes, and transfers information. In addition, Holt (1987) suggested that there is an integrated information system for management information systems so that the management can make

decisions. According to Sprague (1980), it is the set of systems and actions required for the use of information as a resource within the organization. Davis and Olson (1985) defined management information systems as an integrated human-machine system that provides support for managers to make decisions and perform managerial functions and actions. It is possible to summarize the prominent message in the definitions as computer-based integrated systems containing answers about determining what information is needed for managers to make more effective decisions and how to record this information.

The Ministry of National Education, which is one of the largest public institutions in Turkey, can be shown as one of the institutions that most successfully and widely implement the aforementioned electronic transformation process. With the electronic services it carries out under the name of the Ministry of National Education Information Systems (MEBBİS), the Ministry has optimized the transactions of its affiliated units in terms of both speed and convenience, allowing transactions to be carried out in secure environments. MEBBIS, which initially had different modules such as "PERSİS (Personnel Management Information System)", "İLSİS (Provincial and District National Education Directorates Management Information System)", "YOSİS (Higher Education Management Information System)", "BUTSİS (Budget Management Information System)", "IMISIS (Administrative and Financial Affairs Management Information System)" and "YDSIS (Overseas Education Information System)", took its current name in 2006 and all its modules were gathered under a single title. As their names suggest, these modules operate on issues such as personnel and budget for the operations of the Ministry and provincial and district national education directorates affiliated to the Ministry. In addition to these issues, the management information system named "e-school - Ministry of National Education School Management Information System" was implemented in 2007 for students, who are the most important stakeholders of schools. With this system, the database created based on the students' identification numbers, keeps the students' information from the first time they register until they graduate. This information includes student absence information, grade information, report card, award and discipline, parent, family private information, etc. (Ozata and Sevinc, 2010). The e-school system, which has been constantly renewing itself since its inception, has paved the way for students' parents to benefit from the system with the "Parent Information System (PIS)", which it has put into practice primarily within its own body. The e-school system, which has gained functionality in more areas with the addition of sub-modules such as student transfer procedures, equivalence processes, elective course procedures, etc., has been designed and put into service so that it can also be used on mobile platforms to expand its use.

Since decision and decision making in management is an important process and this process is supported by computerised information systems in the last quarter of the twentieth century, attention has focused on the "data-information-decision" process and the approach called "decision support systems" has found its place on the agenda (Kuruuezuem, 1998).O'Brien (1993) defined DSS as "information systems that provide interactive and de facto support to decision-making processes". (Ogut, 2012). In

addition, a skeptical approach to what DSS is has also been developed and it has been revealed that this system is a new form of information system in organizations. The history of DSS, which was first introduced with the term "management decision systems" by Morton (1971) in the early 1970s, dates back to Simon's (1947) classic book "Administrative Behaviour". There have been many studies on what DSS is, which has many definitions in the literature, and what features it should have. So much so that Alter (1980) examined 56 systems claiming to be DSS and produced summaries describing their characteristics. Similarly, Keen (1980) defined 30 different systems that he thought were DSS and compared their properties. When the items characteristically presented by Alter, Keen, and other researchers who have worked in the field are examined, the common points seen are as follows (Sprague, 1980):

- DSSs aim to solve less structured, highly uncertain problems faced by high-level managers.
- DSSs try to combine models or techniques that include classical data entry and data acquisition functions.
- DSSs focus on providing an interactive environment especially for users with a low level of computer skills.
- DSSs give the user the ability to easily adapt to changes in the decision-making approach and environment.

At this point, it would be appropriate to reveal the relationship and differences between management information systems (MIS) and DSS. The birth of DSS was due to the inadequacy of management information systems. The environment in which the decision is made is important for managers to make correct and timely decisions. (Sayin and Sen, 1996). Although the data sets informing about the daily functioning of the organization, which management information systems are responsible for, are sufficient for middle managers, top managers need more than the information provided by management information systems to perform their decision-making actions. Sprague and Carlson (1986) developed the "Hierarchical Approach" to express the relationship between DSS and MIS, and in this approach, they focused on the tasks of each unit in the "data - information - decision" stages.

As in other organizations, decision-making is a fundamental process of the management of educational organizations because, like all other institutions, schools are structures based on decision-making (Hoy & Miskel, 2010). So far, it has been tried to give information about the decision-making process, models and types in organizations in general. As with many other issues, some differences and difficulties may arise in decision making because of the unique aspects of education and schools. Since public educational organizations are non-profit, it is difficult and often impossible to calculate the relationship between cost-benefit and input-output, which economists or commercial organizations often focus on. This difficulty leads to the fact that the options are not taken into account as much as necessary in the decision-making process, which is already a process of making choices (Bursalioglu, 2002).

Even if there are difficulties, the essence of the work is that schools are structures based on decision-making and from that point on they experience a decision-making process. Today, the decision-making process in schools focuses on the situationality of educational institutions, human nature, technology, and institutional uncertainties (Estler, 1988).The solutions offered to the problems encountered with this focus have also diversified and become more complex. In this complex situation, it does not seem like the right approach to expect a school administrator to search for "synoptic", that is, the most appropriate solution. Instead, it would be more appropriate for the manager to find satisfactory solutions mentioned in the "managerial model" while explaining the decision models (Bursalioglu, 2010). While seeking satisfactory solutions, it should not be overlooked that schools are democratic organizations and that individuals affected by the decisions made in the organizations should have a say in this decision (Aydin, 2010). Since schools are not only democratic organizations but also physically large institutions, problems can't be solved by a single person. For this, all stakeholders, especially teachers, should be involved in decision processes at the maximum possible level. Based on this participation, school administrators also need the contribution of their colleagues with their knowledge and experience (Ozden, 2005). In addition to all these, because the forces affecting schools are dispersed and these influences are fluent, the decisions of the administrators should be definite and sudden most of the time (Bursalioglu, 2002). Since these sudden decisions will be unprogrammed as described in the decision types, school administrators will react instantly and experience the decision stage either alone or with limited external contribution. For this reason, school administrators will either use the traditional strategy to act with intuition and decide, or at this stage, they will use computers as a modern technique (Simon, 1960).

In the early 2000s, the Ministry of National Education aimed to both keep up with the needs of the age and speed up the processes in the public sphere by providing a number of electronic services within the scope of Management Information Systems. These electronic services, which were very successful when they came to life, have come with many updates until today. However, considering that even 1 year in the sector of information technologies is a very long time in terms of development, issues such as the current situation and the users' expectations show changes and developments during this time.

DSS, which is frequently mentioned today, enables end-users who want to work with these data to access data located outside or inside organizations easily. Thus, the necessary information can be accessed both quickly and on time, and it increases the efficiency, effectiveness, and quality of the decisions taken by helping the timing of the decision-making process in institutions (Arslan & Yılmaz, 2010). This research aims to reveal the conversion of existing electronic services offered within the scope of management information systems to DSS to make the decision-making process more effective in school management by using grounded theory work. The main question for the study to reach its goal is “What kind of theory can explain the transformation of management information systems into DSS in making school management and especially the decision-making process more efficient?”

Method

It would be more appropriate to directly listen to and observe the people affected by any problem, instead of making measurements to make a study on facts, thoughts, and experiences about that problem. This study uses a theory study based on qualitative research designs, as it aims to put forward a theory for the conversion to a DSS by including especially the experiences and suggestions of the users regarding the electronic services currently offered by the Ministry of National Education. In addition, qualitative research is very effective, especially in theory development, and the information obtained through the real-world interviews and observations of the researcher himself is obtained by the inductive method and the theory is put forward (Patton, 2014).

Qualitative research can be defined as the explanation of previously unseen and unknown results in a relational context by revealing events and perceptions in their environment holistically and realistically through interviews, observations and document analysis (Yildirim & Simsek, 2011; Glaser, 1978). As it is known, over time, societies change voluntarily or involuntarily in the context of the social organizational structure and the functioning of this structure (Kurtkan, 1968; Gunay, 1993). Although the types of this change can be grouped under many different headings, Burrell and Morgan (1988) developed four different paradigms for how change occurs: radical structuralist, structuralist, radical humanist, and interpretive paradigms. Habermas (1987) analyzed the interpretive paradigm under two headings: the "Phenomenological Symbolic Interaction Approach", which describes the social world and arising from interpersonal interaction, and the "Ethnomethodological Approach", which describes the subjective world we create individually. Regarding the interpretative paradigm, it is possible to say that reality is created through the interaction between individuals, in other words, through "conversation - discussion - agreement - reconciliation" or as a result of the subjective experience of the person who is described as a phenomenon (Gunbayi, 2016).

The beginning of the century we are in in the Turkish education system is when many innovations were implemented, especially in electronics and informatics. Contrary to classical practices, the processing and evaluation of data through electronic services enabled the transfer of paper-based processes of the national education senior management and schools to digital media. Since ensuring the sustainability of innovation is as important as introducing innovation as a requirement of the age, the opinions of actual users of these services, which are the most important element of existing electronic services, are important in order to respond to changing needs and thus ensure sustainability. However, appropriate questions to be asked to them and the answers to these questions will enable to increase the efficiency of the use of electronic services in school management, which is the ultimate goal of the study, and to transform into DSS to make more effective decisions in schools. For this reason, in this study, qualitative research methods were used to present a model on the way to DSS, along with the experiences of the participants on the existing electronic services, their troubles, the causes and solutions of the problems, and to enable this model to explain a theory.

Many electronic services are provided to schools within the scope of management information systems in the Turkish education system. These systems appeal to all school stakeholders, especially school administrators, and help the school's business and operation. The main question is how these systems will be made more effective and can be used in the decision-making process, which is one of the important processes of management, especially for managers. This study explores ways to make the administrator's decisions in all management areas, especially in the academic field, more effective with the management information systems offered by the Ministry of National Education. In this study, a grounded theory study, which is guided by the theoretical perspective of phenomenological symbolic interactionism and ethnomethodological approaches, has been carried out, since organizational activities, which is one of the assumptions of the interpretive paradigm, are characterized as symbolic documents and these activities are tried to be interpreted through interpretation-science method analysis. In addition, the study is based on the interpretative paradigm, as it focuses on the evolution of currently offered electronic services.

Grounded theory is a method in which propositions or theoretical models are created based on the data obtained by examining the activities, behaviors, and procedures that take place in the environment where the study is carried out (Glaser and Strauss, 1967). Grounded theory, which is known to provide certainty, clarity, and flexibility to the researcher in the study process, the most basic feature of it, leads to the theory through the analysis of the data collected systematically at the end of the research process (Strauss & Corbin, 1990). Grounded theory studies, which are accepted as the most effective qualitative research model on social science, focus on creating the theory itself rather than starting from an existing theoretical framework (Denzin, 1997; Patton, 2014).

Changes have been made in the application and assumptions of grounded theory studies since the day it was put forward, both by those who contributed to the literature and by those working in this field (Caliskan, 2011). The grounded theory studies, which were initially carried out with a positivist approach, have been replaced by anti-positivist approaches over time. When the historical development of the grounded theory study is examined, it is observed that the theorists differ especially in the coding phases, although the end point is the same. In this study, Strauss and Corbin's (1990) 3-stage (open coding, axial coding and selective coding) coding is based.

In this design, the analysis consists of the interaction between the researcher and the data obtained, and in fact, the process itself is a "coding procedure" that directs the research and sets standards (Strauss and Corbin, 1990). Grounded theory studies, regardless of the subject studied, seek answers to questions such as "What is the theory that emerges from systematic comparative analysis? How are contributions to the field observed and theorized?" (Patton, 2014). Open coding, which is the first stage of grounded theory studies, is an interpretation process, and in this process, all the data obtained from the participants are analyzed and divided into small pieces. In other words, by labeling each idea provided by observation, interview and document analysis,

themes and sub-themes related to these themes are obtained. Open coding is carried out without losing time as soon as the data is obtained with the help of the specified techniques. In this study, following the individual interviews, open coding was started and the sub-themes were obtained without being tied to the upper theme. In the second stage, axial coding, the relationship of the obtained sub-themes with the parent theme to which they may be connected is tested. If the sub-theme's connection with the theme is not confirmed in this test, the researcher expands the theory by investigating the reasons for the participant's response to this sub-theme. In the last stage, which is selective coding, all the sub-themes obtained are combined with the parent themes to which they belong, on the "main theme" based on the main theory. In summary, the researcher generalizes the theory analytically by asking questions such as "If I were to sum up my findings in a few sentences, what would I say?", "What is the main analytical idea presented by this research?" (Strauss & Corbin, 1990). In addition, according to Patton (2014), theorizing primarily involves understanding or anticipating thoughts and concepts, and then formulating them in an explanatory and rational way. Based on these statements, the purpose of using grounded theory work in this study is to transform the management information system that already exists and includes all the data belonging to a micro-scale school. While performing this transformation in the study, the stages of grounded theory study were used by following the order of understanding the concepts presented by all the features of the system, establishing a relationship between the concepts with comparative analysis, and revealing the model obtained from the established relationships.

Study Group

Purposive sampling method, one of the participant selection methods used in qualitative research, was used in the study. Purposeful sampling, which emerges as the opposite of probability-based sampling used to generalize to the population in quantitative research, ensures that participants who are thought to have mastered the subject are studied in detail. In addition, the "theoretical sampling" technique was also used in the study, since it included participants who were thought to be ready for theoretical knowledge. In theoretical sampling, which Glaser and Strauss (1967) used for the first time, the data collection process continues until the process or concepts that can answer the research question are repeated. For this reason, the researcher is not initially informed about the size of the study group (Yildirim & Simsek, 2011).

6 school principals, 5 vice principals and 6 guidance teachers, working in 4 state secondary schools, 3 state Anatolian high schools, and 2 state primary schools, participated in the study voluntarily. Demographic information of these participants is presented in Table 1. In the selection of participants, preference was given to those who were directly involved in the decision-making process in school administration. In addition, care was taken to ensure that participants worked in public schools. The reason for this is that private schools use various software similar to decision support systems in addition to the management information systems offered by the Ministry of Education.At this point, it can be questioned why the school principal, vice-principal, and guidance

teachers are preferred as participants in the study group. As it is known, school principals involve all the stakeholders of the school in this process in order to make effective decisions in schools. Although all stakeholders are involved in the process, the final decision belongs to the school principals.

For this reason, school principals should be included in the working group. In addition, school principals may need to take immediate action when faced with problems that require urgent decisions or in routinized decisions. The advisory authority is the assistant principals and guidance teachers in such cases. For this reason, these two groups need to take part in the study as participants.

Table 1.

Demographic Information of Participants

Code	Title	Branch	Seniorty (Years)
GT01	Guidance Teacher	-	22
VP01	Vice-principal	Information Technologies	8
GT02	Guidance Teacher	-	9
GT03	Guidance Teacher	-	14
GT04	Guidance Teacher	-	24
SP01	School Principal	History	16
VP02	Vice-principal	Biology	25
VP03	Vice-principal	Foreign Languages	11
VP04	Vice-principal	Information Technologies	12
GT05	Guidance Teacher	-	18
GT06	Guidance Teacher	-	18
SP02	School Principal	History	26
VP05	Vice-principal	Physics	22
SP03	School Principal	Primary School Teacher	26
SP04	School Principal	Primary School Teacher	16
SP05	School Principal	Information Technologies	13
SP06	School Principal	Information Technologies	18

Individual interviews used in grounded theory studies are coded instantly, as soon as the interviews are over. While this stage is called open coding, the interviews stop when the obtained themes repeat. For this reason, the opinions of 17 participants working from 9 different public schools provided the data that will form the basis of the study.

Data Collection Tools

Observations and interviews with participants are the most commonly used data collection techniques in grounded theory studies. In addition, there may be a need for document analysis to support interviews and observations (Hancock, 1998). Data were collected through individual interviews with school administrators and guidance teachers through a semi-structured interview form. In addition, documents that help the education and training processes in schools and documents in the form of printed materials belonging to student personality services in school guidance services were also used as data sources in the research.

Data Collection

Before starting the individual interviews, the purpose of the research, which was summarized in the interview form, was shared with the participant and the participant was informed as audio recording would be made throughout the interview; With permission, the interviews were recorded on a voice recorder. After each interview, before starting a new interview, the transcript of the last examined document and voice recording was analyzed and coding was carried out. For confirmation purposes, the interview transcripts were compared with the interview recordings by the field expert, and the transcripts and records were verified. In accordance with the coding logic of the grounded theory study, the code list created prior to the interviews was continuously compared with each transcript, and new codes identified as missing using an inductive approach and formed according to the existing transcript were added to the code list or changes were made to the existing codes.In this process, which Glaser and Strauss (1990) refer to as "continuous comparative analysis", the interview form was constantly updated and detailed with new codes. This update process ended with the repeated recurrence of the answers. Content analysis and descriptive analysis methods were used while analyzing the data during continuous comparative analysis.

Data Analysis

According to Merriam (1998), data analysis to make sense of the data obtained is intense, tiring, and complex. In all this difficult analysis process, NVivo 10.0 package program was used, which partially facilitates the coding process in qualitative research and enables to master of the research in a holistic framework. Again, as mentioned before, data collection and analysis are carried out simultaneously in grounded theory studies.

In the first stage, open coding, the interviews were coded simultaneously, the field notes were reviewed after each interview, and the memos on the documents examined and the interview, in general, were evaluated. At the axial coding stage, to reach the main question of the research, it was tried to reach subcategories from the categories obtained in open coding.

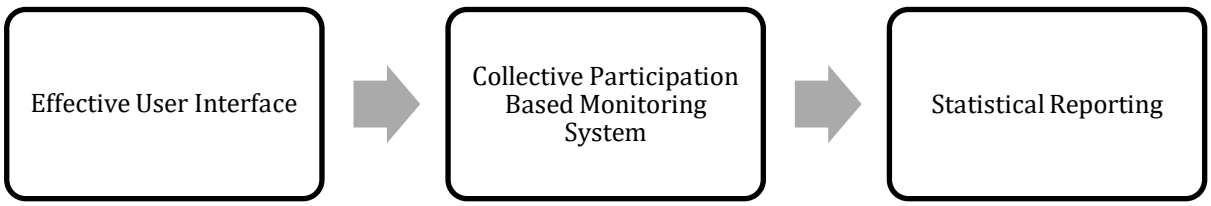
In the way of answering the question “What theory explains the use of electronic services as DSS for effective decision making in schools?”, three intertwined sub-models were obtained and as a result, the transformation model to be made to DSS in school management was reached. To present this model with clear expressions, it was necessary to make changes in the themes and sub-themes obtained from the research, some themes were grouped or their names were changed. In this last stage, which is called selective coding, the main theme and sub-themes related to this main theme were obtained and the answer to the main question of the research was obtained.

Findings

The results were examined under three subtitles. The first of these subtitles is "Effective User Interface", one of the main titles of the model that emerged as a result of the research, and the other two subtitles are "Collective Participation Based Monitoring System" and "Statistical Reporting". The general view of these titles, which are similar to the "input", "process", and "output" elements of the system approach and how these elements relate to each other, is shown in Figure 1.

Figure 1.

Titles of the Suggested DSS Model



Each sub-title will be referred to as "theme", which was finalized due to selective coding following the qualitative research terminology. These themes will be examined in detail with their own sub-headings and the term “sub-theme” will be used for these sub-headings. Only the findings will be included under this title, and the explanations of the themes and the researcher's opinions will be presented under the title of conclusion and discussion.

Effective User Interface

The first of the main components of the model is the "Effective User Interface", which corresponds to the "Input" element in the system approach. Although the term interface is used in many areas, it is expressed in informatics as an audio-visual tool that provides communication between the user and the system through pictures, sounds, fonts and colors (Rudisill, 1996). Since it is the cornerstone of interaction between the software and

the user when using a software, it can be assumed that the designed user interface should have a structure that meets the needs and enables faster work. When the answers of the participants are examined, it is seen that the necessity of an effective user interface is emphasized in the model. In the light of the findings and as a result of selective coding, two sub-themes were formed under the theme of "Effective User Interface": Design, Active Update.

Design

Under the heading of "Design," the first subtopic of the Effective User Interface theme, there are opinions on the visual features that should be included in the DSS, as evidenced by the selective coding applied to the participants' opinions. Examination of these opinions reveals that 12 participants expressed their opinions in the codes "Data reliability" and 4 participants expressed their opinions in the codes "Customizable interface with unorganised access"; accordingly, two codes were formed for this subtopic: Data Reliability, Customizable Interface with Disordered Access.Some of the opinions of 12 participants who expressed their opinions under the "Data Reliability" code are as follows:

> My biggest doubt is whether this information is accurate or up-to-date when I get information from here... Examples that can be increased a lot, but in summary, I can say that to make a decision, there is a need for concrete, up-to-date, reliable information, or what you would call it. This has to be achieved first. (VP01,2,1,1)

> But of course, if the information of the new students is not updated, the class teachers will ask how many siblings the student has, with whom he lives, where does he live, does he have any illness? Has he had any surgery? If the information such as whether he has a disability has not been updated, you do not have a chance to learn much about the child's special situation. (VP03,2,1,1)

All 4 participants expressed their problems with the currently used interface and expressed their views on the importance of interface design to be used in a DDS:

> When you enter the e-school, there is something on the left side, the menus. There is so much that it is difficult to search even in it. These things need to be simplified further. There may be information about students, parents, academic success, but these need to be classified better. (VP03,2,1,2)

> In other words, I think that the data we will need in these management processes should be included in these modules with a more accessible quality. I think that faster and more practical structures should be created for the data needed in both the e-school and MEBBIS systems. (SP06,2,1,2)

Active update

Three sub-themes were formed when the opinions of the "Active Update" sub-theme were classified. The codes of these sub-themes are grouped under 3 headings: Proactive Agenda, External Data Sources, Instant Data Entry.

The opinions of the 6 participants regarding the "Proactive Agenda" code, which highlights the early warning system logic, are as follows:

> In addition, as administrators, we are divided into too many situations during the day, schools are in trouble in terms of physical and cleaning, we need to determine our priorities. You know, we need information to take urgent measures for urgent matters related to the school. Additions can be made to these... For example, a class made absenteeism permanent at a certain time on a certain day of the week. I should be warned about this immediately to learn what is going on at that hour of the lesson, maybe there is something from the teacher or outside. It should warn me about these. (VP01,2,2,1)

> There are different modules about the school for this information, but the information on the requirement does not appear there, for example, for the information about the school's needs. (VP03,2,2,1)

The views on the "External Data Sources" code, which 5 of the participants envisaged to transfer data sources from the common database, are as follows:

> It is not enough in terms of special situations, of course, more specific information is needed. Like what? For example, the mother died, why she died, and how old was the child? What was the extent of the trauma experienced by the child when she died? These are important, for the more special of the child. (SP03,2,2,2)

> Here, the truth of the matter is that it is not right to put too much pressure on the teacher. You mentioned being an information society at first. If we can fully reflect the characteristics of the information society, then it would be better if we could do this with a common database without waiting for anyone to enter this information. This is what it should be. (SP04,2,2,2)

4 of the participants agreed that the users of the system should be active data or information providers:

> We, as administrators, cannot do this job of taking notes day by day. Our workload is already clear, either only a staff member for breakdown recording and solutions should be available for these works, or a system should be given to our teachers with a mechanism such as self-control, where everyone is responsible for their own class. When a problem is encountered, the class teacher tells me about it, and I take note of it. I'll write it down somewhere, but there's a chance I'll forget. At this stage, we can use electronic environments more efficiently, by giving our teachers responsibility with a slightly more flexible system, each classroom teacher should be able to share their problems regarding the physical condition of their classroom, and we can collectively see these problems and take precautions... Others will not start from the beginning if the same problem happens tomorrow. (VP05,2,2,3)

Collective Participation Based Monitoring System

"Collective Participation Based Monitoring System", which corresponds to the "process" element within the framework of the system approach, appears as a theme in which data and information coming from the "Effective User Interface" are processed and transformed into information on the way to DSS. The most important factor for the theme to get this name is that all elements are in asynchronous communication with the system

to create a memory in the dimensions of teachers, students, and institutions within the institution, and these elements are kept under control in a follow-up system based on continuity. This monitoring system focused on three main stakeholders of the school, and sub-themes were formed according to these three stakeholders: School Monitoring, Teacher Monitoring, Student Monitoring.

School monitoring

When the opinions of the participants are examined, it is remarkable that all the work of the school should be carried out electronically, both physically and based on structuring, for the DSS to be established in the electronic environment in schools. In particular, four codes belonging to this sub-theme were obtained from the statements of the participants who expressed their opinion that it would be appropriate to carry out this monitoring within the scope of "Institutional Memory", "SWOT Analysis", "Physical Equipment" and "Structuring and Decisions".

Eight of the participants stated that it is necessary for everyone involved in the school to compile all the data from the school's past to the present in a mass form, thus developing institutional memory. Some of the participants' opinions on this code are as follows:

> For example, the school should have a report on a developmental past, present and future. Past experiences should be transferred to future administrators and teachers, in tersm of both physically and educational. There can be such a study so that every newcomers do not start over again and again. (VP01,3,1,1)

> Unfortunately, this is how the newcomer will learn. It will start from scratch. I try to associate it with decision making, but you need to know to make a decision. If not, you will falter, you will decide, wrong results will come out, you will make new decisions and make the right decision by making mistakes like this, but lost time, effort, maybe money is gone... Here, every newcomer will make new decisions, they will be wrong, they will be made again, etc. I should be able to write in the form of an information note. I should be able to enter information notes like the environment of this school, this school has a constant problem like this, the cafeteria is like this, these things have been done, these things have been tried to be done but it did not happen, it did not happen because of anything, so the next principal after me will go one step further. (SP02,3,1,1)

Again, eight of the participants emphasized the need for SWOT analysis of the strengths and weaknesses of the school, as well as the opportunities and threats that may arise from outside the school and from the elements of the school itself, based on this institutional memory code. Some of the participants' views are as follows.:

> I must be able to see in detail the analysis of the current situation. Before I do anything, I must know about the threats and opportunities that have been updated from the past to the present. (VP01,3,1,2)

> I'm trying to get to know the school, there is no information about getting to know the school's student profile. I try to learn it by asking questions, asking friends, talking to parents as I meet them. You cannot direct a school without knowing a parent's mentality about the school's environment. (VP04,3,1,2)

Three of the participants stated that the dysfunction of the existing information on behalf of the physical equipment of the school could be realized by including more detailed information and monitoring accordingly:

> In fact, it does not give very clear information about the physical conditions of the school. I don't know, there is information such as the number of classrooms, the number of information technologies classrooms, how many square meters of the area it is established. (VP02,3,1,3)

> There is a computer laboratory, but in what year were the computers purchased, what models are they, are they old or new, can they meet today's needs? Which computers are popular today? We cannot know these. Or there is a library, but we do not know how many students use it. We have classes, but how many desks do they have, how many of them need maintenance, if I need to know about them urgently, I have to visit the whole school, I have to make a scoreboard. (SP02,3,1,3)

All three participants pointed out that the information on the school's structuring and how this structuring will be available in the electronic environment will contribute to decision-making:

> The school has a principal, a vice-principal, a guidance counselor, teachers, and an officer. Do you think there is much coordination between them? This is one of our biggest problems. Decisions are made to carry out a job, but who is responsible for those decisions is not known, so we are trying to find out by researching. We chose the first aid team, the drill will be done, let's call and find the first aid team, the teacher forgot that he is in the team, even though he knows, he doesn't know what to do. The teacher does not know which vice-principal is responsible for which level. A letter has come, the officer will write a reply, but he is not aware of the decisions of the teachers' board. (VP05, 3,1.4)

> We set up a more advanced system of the e-school and gathered all the paperwork in one place. We aimed to improve the management system. We enabled every teacher to Access many papers such as BTB's (Branch Teachers' Board) Report, Teachers' Board Report by giving each teacher a password, and from the beginning of the year, everyone in the school could see all their duties in one place. If you ensure that the information is recorded regularly, you do not need to say "bring me the meeting reports". And in situations like ours, where there is public access, the teacher always knows what the assignments or groups are. But that's not the case with the current system. (GT02,3,1,4)

Teacher monitoring

Teacher monitoring is another sub-theme of the "Collective Participation Based Monitoring System" is teacher monitoring. According to the participants, the monitoring of teachers focuses on making judgments about teachers, drawing conclusions and

making the necessary provisions for the problems that may arise in the educational and training processes according to the dimensions of "academic career", "in-service training" and "teacher attendance" of teachers working at the school.

Eight of the participants expressed the opinion that by including the academic career information of the teachers in the system in detail, consistent decisions can be made in order to employ the right person for the right job, especially in the education and training processes. Comments on this code are as follows:

> What do we decide? Like whether the teacher should attend the 9th grade or the 10th grade. We make this decision by asking the teacher about it. Now, the curriculum of some levels is easy, the teacher insists on that level. We say, "What levels do you teach?" for example, "9th grades, I always taught classes". Well, then we say "you have to attend the 9th this year". İt is the same next year and after that. For example, let's see which classes the teacher taught in his 20th year, that is, in 20 years, to decide how to proceed from there. Let's see an average grade, let's say, like "aha, successful at this level, insufficient at this level". MEBBIS can facilitate our work in these matters. (VP01,3,2,1)

> Our expectation from MEBBİS is to support us in making inferences about the teacher. For example, what classes did the teacher teach in the past? If he could make our work easier with some information such as which of them was more successful. That's how I want it, so we decide more objectively. (VP03,3,2,1)

Three participants, arguing that teachers' in-service training information is effective in decision-making processes in schools, emphasized the importance of monitoring this information:

> … there is a lot of information available, but I need a set of information about teachers. For example, he says, 'teachers who have received in-service training in this and that field'. But I can't find; I have to look at the in-service status of all the teachers one by one, it is an incredibly time-consuming situation. This is a school with 65 teachers, I can't think of those who are 100 or more. This information is actually available, but after looking at it one by one, what use is the electronic medium? By the way, let me give another example from in-service training. There are certain areas where our teachers need improvement, of course, and there will be in the future, but for example, if such a thing were to happen, which areas did the teachers receive in-service training, and who might need what, MEBBIS could guide us. (VP01,3,2,2)

> But it would be better if there was a teacher version of the e-school, and it would be used more efficiently and frequently. For example, some things need to be done in schools, things that certain groups have to do. And these works are always contracted to certain people for some reason. For example, in that group, there is a teacher who has received in-service training on project development, but you can't give the job to a teacher who has never done a project before or has never been trained on this subject. Many of our teachers are still standing with almost university knowledge, they did not develop themselves, they did not go to a single in-service training related to their field or pedagogical field. We call it FATIH Project, but we encounter teachers who cannot use the learning management system. I should know about the teachers who are in such a

> situation through the system and of course, I can force that teacher to improve himself by taking the legislation behind me. (VP02,3,2,2)

Two of the participants stated that the continuity of the teacher is also important on the educational processes and that if a decision is to be made in this area, it is absolutely necessary to follow up the teacher in this regard:

> We are making a lesson plan, I am telling you because it happened to me. I have just been appointed to the institution, there is a certain amount of lessons in total. We distribute it equally to the teachers, but one of the teachers gets sick all the time. He has the legal right, what can I do, he is on a report for 10 days and 5 days, it's like he is on an excused leave. Later, I learned that the teacher, like the student, has made a habit of absenteeism. At that time, I learned that while the course distribution is being made, it is necessary to have information about such teachers and I thought that it is necessary to give the least possible lesson hours. If they attend fewer lessons, fewer children will be victims and a solution can be found. I am not Saying that the teacher is necessarily malicious, he/she may have a small child or a patient. He/she can't come for 2 hours in the morning. Here, I tried to explain that if there is to be an indicator of the teacher, which I think should be, the attention the teacher gives to his work is equivalent to the time he spends at school. It is necessary to distinguish the teacher who is at the school, both for a lesson and for another activity. (VP05,3,2,3)

> Analyzes, including reports such as sick leave, help us decide which teacher is more likely to be absent. (SP01,3,2,3)

Student monitoring

According to participant views, if a DSS is to be implemented in schools, this system should also include elements of student follow-up. Since students are the main focus of education and training processes, it is also striking that the points to be followed on them are detailed and numerous. The most obvious indicator of this is the collection of opinions on topics under the headings of "Academical", "Orientation", "Student Affairs", "Psycho-Social Development" and "Developmental Health Status".

Eight of the participants stated that students need a system that includes their previous academic knowledge and experiences throughout their academic life, but that it will be possible to monitor a student in an academic sense. The opinions of the participants on this subject are as follows:

> Especially as of this year. We cannot access the child's old data, we cannot access a graduate student... I think there is no point in entering the data for one year and closing it the next year. (VP04,3,3,1)

> All grades of a student from the first day he/she enters primary school to high school... (SP01,3,3,1)

> It cannot be said to be sufficient academically. There is no past grade information, for example, there is the year of the current period, but there is no history. The past is also important. (SP03,3,3,1)

Again, eight participants indicated that monitoring students would help guide the student properly so that students can be where they need to be in their next educational life, or that an approach can be developed for the student by understanding the reasons for a direction that has already been given. Participants' opinions on this code are as follows:

> We accept students in the 9th grade. Until the 12th grade, I should be able to know in which courses this child's success has increased or decreased, what precautions can I take, whether his absenteeism has increased or decreased compared to the previous year. (VP01,3,3,2)

> Elective courses are a little more difficult, but as far as I understand, the system we want to apply is a good system in my opinion. It is actually a similarity to the old credit system that students want. Let him choose the courses he wants many times within the legal framework, and graduate comfortably. But unfortunately, the next process, the higher education process, is not suitable for this. I think it will make sense for the child to choose it in elective courses if it is a course that he cannot benefit from in higher education. But children, you can choose courses easily after a certain grade at 9, 10, and you have trouble with elective courses at 11 and 12. (VP03,3,3,2)

Seven participants agreed that in addition to the academic monitoring and guidance system in DSS, it is necessary for schools to monitor the student in matters such as award disciplinary procedures, attendance absenteeism procedures so that decisions to be made about the student are more consistent:

> Or a student with increased absenteeism needs to reveal the reasons for this. I think that the information about the guidance work should also be collected. (VP02,3,3,3)

> Disciplinary punishments, if any... I must be able to access changes in family life... At what times was the child absent, especially? (SP01,3,3,3)

Five participants drew attention to monitoring their "Psycho-Social Development" to monitor students within the scope of DSSs in schools. The opinions of the participants of this code are as follows:

> There is not much for our students either. Parent information, identity information, photocopies are already available to us. General information, these were height, weight. Who he sits with, his rewards or punishments. But if we are going to make an assessment, especially if we are going to assess the child's psycho-social development, we cannot do it by looking at the data there. There is only exam information, and that information can be seen only for that year. (VP04,3,3,4)

> It can be improved of course. Particularly in my own guidance field, sections can be added. Interests and talents can be processed to see the child's interests and abilities from the past to the future... Learning styles can be added. (GT01,3,3,4)

Four of the participants are of the opinion that within the scope of the "Student Monitoring" sub-theme of the "Collective Participation-Based Monitoring System", it is also necessary to monitor the developmental health status of students, so that decisions to be made about students can be made by considering their health status:

> Now the child got sick, he did not have diabetes, but later he became diabetic. I am 3 years this year, the boy graduated from here and went. "Do you know that my child has diabetes?" This information should be included in the e-school, when a child is enrolled in the school, information is entered randomly. In the format of the Ministry, this information will be more valid, reliable and will make our job easier, will be found in every school's system, and the student's health and family information will be at my fingertips at any time. We collect a lot of things on papers, I have 1620 students, a lot of paper expenses. (GT02,3,3,5)

> What were the diseases he had, how long did it last, is there any continuation? (SP01,3,3,5)

Statistical Reporting

"Statistical Reporting", the last element of the model, includes comparative statistical indicators that include both current situation analyzes and future predictions in the decision-making process. These statistical indicators are obtained by transforming the data from the "Effective User Interface" item into information through the "Collective Participation Based Monitoring System". This element can also be identified with the "output" step of the systems approach. When the participant opinions are examined, it is seen that the opinions are gathered under two sub-themes. First of all, obtaining information about the current situation expected from the system is to have the opportunity to make flexible reporting during this information acquisition process. The second feature expected from the system is that it allows users to make projections and make predictions about the future in light of existing data and information. Due to these expected features, it is possible to say that the "Statistical Reporting" theme consists of two sub-themes: Situation Analysis, Predictive Reporting.

Situation analysis

According to the participants' opinions, it is important for the analysis of the current situation to report the data and information in detail so that the decision-making process can be based on sound, consistent and reliable information. Keeping data and information in the hands of customized reports to create output will form the basis of the final decision to be made and will allow a good understanding of the situation to be decided. While the participants gave information about which situations need analysis, they also expressed their opinions on reporting this information would be subjected to. Accordingly, the "Situation Analysis" sub-theme consists of "Education-Training

Processes Reporting", "School Physical Equipment Reporting", where the situations to be analyzed are collected, and "Flexible Reporting" and "Comparative Reporting", where opinions are collected on how this reporting should be.

Ten participants felt that there should be flexibility in reporting on issues such as the selection of information to be reported and the nature of the report:

> I've always thought of this. This information is entered every year, right? This information should be stored and I should be able to access data from 10 years ago, such as a search engine. Let me do my search myself. Instead of giving feedback, there are standard templates determined by the Ministry, instead, what we need at that moment is not only me, but many friends, everyone needs something different. It needs to work with the logic of a search engine for what we want... We should be able to search for more detailed data easily, store it nicely, and find it directly at the point where we decide. In this direction, collecting the data well and making it ready for us makes our job easier. I think it reduces time usage. (VP04,4,1,1)

> The Ministry wants a list, with the identity and date of birth... Well, there is no such list. We collect all of them from different places, we take one from one place and the other from another. It would be better if we could choose these reports, many problems would be solved. (VP05,4,1,1)

While seven participants complained about the disorganization of the information in the current system, they especially pointed out the necessity of reporting detailed information about the physical equipment of schools, which have many physical elements. The participant opinions about this sub-theme are as follows:

> The key information is there, it can be different to understand the environment by experiencing it. Again, it is up to you, the building is the same everywhere, but the contents and atmosphere are different, it is up to the person, namely the manager, to draw conclusions... Information is okay, but naturally, we need to create and present something. There is definitely a need for statistical studies. There should be a system that reveals the changes made from the past to the present so that we can make a faster and more precise interpretation. (VP02, 4,1,2)

> The school has general information, but for example, if I want information about a classroom instantly, I don't have it. If I want instant information about my library, who uses it, how often, how many books are there and similar information is unavailable. (SP01,4,1,2)

In addition to reporting the physical equipment, six participants stated that the reporting to be made within the framework of the education-teaching processes is essential for deciding on all factors related to this situation, especially the academic status of the school:

> These are physically; The situation is the same in terms of academics, especially the numbers, it's always just a student-based system. There is no general analysis, we need to be able to get information about classes, their problems, especially the situations that affect their education life... This does not contain information about which courses of a class are successful, which have low success levels, and their reasons. (VP01,4,1,3)

> The Ministry of National Education constantly asks us for statistical information, believe me, we spend most of our time in the archives. It is also easy if data is requested only for this year. Still, when data is requested for 2015 and before, we cannot obtain this information in any way when information is requested about the reading rates or the status of X student... There is personal information, but no private information. According to the status of the report, for example, a warning can be made as "this person has received so many reports in a year, you can do research". After all, the permission information of the people is also included there. It is necessary to compile the data that we enter one by one. This information is necessary for the school administration. The administration can take precautions, it may encounter a different situation, this is needed for the school administration to have a plan B. (VP04,4,1,3)

All six participants expressed their views on the importance of the reporting process for DSSs to make comparative analyzes by making use of the possibilities of statistical science:

> If we evaluate it from an educational point of view, what is the general success status of the school's classes? Compared to other classes or other schools, we do not have a chance to get any of the minuses and pluses of a class. (VP01,4,1,4)

> Or when we want to compare grades between classes, we don't have such a chance. We only get the grade information of the class, other than that, we have no chance to make any adjustments ourselves. (VP05,4,1,4)

Predictive reporting

The most important feature of DSS is that it allows users to make a prediction in the decisions to be made in the future in the light of the data, information, and knowledge obtained about the current situation. In this context, it is inevitable to encounter this issue in the participants' opinions from whom the research data were collected. Based on individuals, students, teachers; in summary, "Predictive Reporting" seeks answers to the following two questions:

1. "Well, what does this quantitative information mean?"
2. "What can be done for the future with this interpretation"

The "Predictive Reporting" theme includes two sub-themes: Interpretation, Guidance.

Six participants expressed that schools should develop interpretations from DSS to numerical indicators obtained by statistical reporting. Opinions on this sub-theme are as follows:

> In addition, I think that whatever you may say about the information and reports I have obtained, I think that this information should be able to help you in terms of what it means or what it means for the future. For example, the student persistently wants a law school, but you see that his

> numerical intelligence is at a high level and you cannot explain this to the student with the data at hand. (VP01,4,2,1)
>
> You can access the information at that moment, but it leaves the job of interpretation to you. So you have to compile and collect the information and draw a conclusion yourself. Perhaps a statistical information study should be done. (VP02,4,2,1)

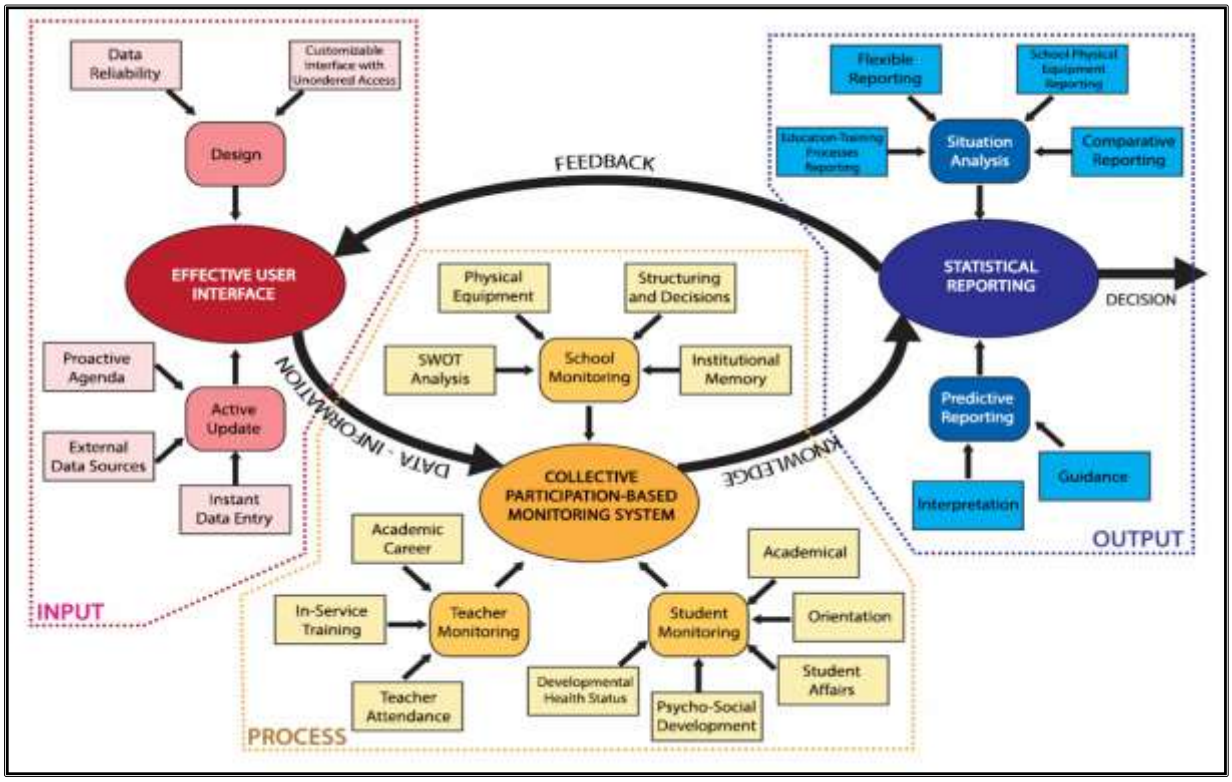
All four of the participants argued that the DSS for schools should not only interpret the information but also guide them in making decisions concerning the future:

> Also, no matter how much knowledge, it is necessary to spend time with the student to get to know the student. Maybe it would be more accurate to get information from the teachers who take the course. Since this time-wasting process is already time-consuming, the computer system can do it for me with the information at hand. As if it had spent time with the student, as if he were a friend of their. Just as a person advises a person they know by looking at his life or the situation they are in, the system should approach it in the same way. In the same way, the system should guide administrators, teachers, and parents. (VP01,4,2,2)
>
> What has changed? There is a need for a study covering all the evaluations to be made from the past to the present on which course he/she is more successful, in which direction he/she should be directed, and where he/she can be more active. (VP02,4,2,2)

In the light of these findings, as will be detailed in the conclusion and discussion section, the visual of the proposed DSS model is presented in Figure 2 in relation to the open system theory.

Figure 2.

Decision Support System Model in Schools



Conclusion and Discussion

Systems can be grouped in two ways, open and closed. An open system takes energy, information, or material from the environment and presents these inputs back to the environment as output after a certain process such as selecting and shaping. In this study, "What kind of theory can explain the transformation of existing e-services to DSS so that the decision-making process in schools can be more effective?" While searching for an answer to the question, analytical generalization has been reached using the systems approach theory. The theory of conversion to DSS has been tried to be explained.

As it can be understood from the definition of the open system, education systems are open systems and therefore schools operate according to the open system approach. According to the Ministry of National Education, while provincial directorates of national education are an open system at a macro level, provincial directorates of national education can be considered as an open system at a macro level for schools. Similarly, it can be said that the DSS model, which was created in this study and consists of the combination of 3 interconnected sub-models, is a low-level open system for schools and our education system.

As mentioned in the method section, one of the most important features of qualitative research is that no generalization can be made, but analytical generalization is possible. This is because of the limited number of participants and a smaller sample group compared to quantitative studies. A qualitative researcher can make analytical generalizations of the results obtained from qualitative data if he/she chooses a design that is appropriate for his/her situation (Yildirim & Simsek, 2013).The operation of open systems that receive information or energy from their environment depends on these inputs from the environment (Katz and Kahn, 1966). Just as schools are open systems, a DSS system to be implemented in schools can be considered as an open system since it will receive input from the school's environmental elements. One of the sub-models of the model presented in this study is the "Effective User Interface" corresponding to this input element of the open system. This sub-model can make inputs to the system, and "raw material" can be provided for the process. In the model described, since DSS is developed depending on computer technology, users need an interface to interact with the system and provide input. How this interface will be effective depends on the transfer of information or data to the system through this interface, which will be provided in the process of transforming information or meta-information. According to the research results, the effectiveness of this interface depends on two basic elements. One of them is the "Design" of the interface, and the other is that the interface allows "Active Update". With these two features and the sub-elements related to these two features, which will be explained in this section, it seems more likely to provide the system with the energy needed by the process.

Another feature of open systems is that they convert the information they accept as input into a product, process or service. Input has taken a new shape at this point (Katz and Kahn, 1966). The open system transforms the information received at this stage of the process into a form suitable for its purpose (Bursalioglu, 2010). It is possible to say that this element of the open system, which is also called the "Process", corresponds to the "Collective Participation Based Monitoring System", which is the second of the sub-models described in this study. As the name suggests, this submodel is a kind of tracking system and is based on monitoring the physical structure of the school, the teacher, and the student, which are the three important elements of the school. It performs this monitoring by providing information to the output element by shaping and grouping the data and information coming from the "Effective User Interface", which is accepted as input, according to needs. The operation of the system is in the form of transferring the data and information from the input unit to the relevant school stakeholder according to the purpose of making a decision and processing it there. Just as in the process of open systems there is a transformation into a product or service, in the model presented with DSS's "Collective Participation Based Monitoring System" a decision-making process is initiated regarding the physical condition of the school, students or teachers. In this phase, the data and information were classified and prepared for use in the output phase. The process operation, which is the link between the output unit and the input unit, and the element in which the actual transformation process takes place, is the most important component of the system (Soenmez, 1987).

An important feature of open systems is that they provide products to the environment. This product is called the system output. All the elements of the open system, which have been named as input - process - output so far, show a cyclical mode of action. The reason is that all or part of the product is used as input to the system. This input that comes back is called "feedback" (Katz & Kahn, 1966). In other words, feedback is information developed to determine the functioning of the system, the problems of its non-functioning parties, if any, and how to solve these problems, taking into account the degree of realization of the goal the system is trying to achieve (Soenmez, 1987). These feedbacks are used to find more effective and efficient by increasing as a pile, and they are elements that have regularity and continuity.

In the DSS model described in this study, the "Statistical Reporting" sub-model corresponds to the system's output, while it presents the "Status Analysis", which includes the indicators of the current situation, to the users. In addition, this sub-model also enables “Predictive Reporting”, which facilitates the making of decisions that shape the future by supporting the comments developed by the users. The output of the process is a meta-information decision on the school, teacher and student within the scope of the educational processes. In addition, this output provides data and information as a re-input to the system with situation analysis.

Another point to keep in mind is that every system can consist of subsystems. Based on this fact, it is clearly seen that there are subsystems of DSS and subsystems of these subsystems in the schools revealed in this study. The system structure of DSS in schools is summarized in Table 2.

There is no need to discuss the importance and place of knowledge in our contemporary society. Everyone knows that today, societies that produce, distribute, market, and use information in the production of new information dominate the world. At the micro-level, this situation is also reflected in organizations. With both R&D studies and computer technologies supporting these studies, organizations are constantly trying to catch up with the era in knowledge production. For this reason, the society we live in is referred to as the information society, and for DSS to operate effectively, a society in which information production is prioritized is needed. According to the results of Cukurcayir and Celebi's (2009) study on the transformation process of our country into an information society, recent government policies and the joint efforts of both the public and private sectors have accelerated this transformation and brought the production of knowledge to the fore. This result is also consistent with the findings of this study. Because the emphasis of the research participants on the effectiveness of "knowledge production" in the definition of the information society shows that the society style perception required for the implementation of DSS in schools is as it should be.

The users of the system have to interact with the information devices since the DSS model that has been put forward works on the basis of information technologies and this technology is used at every stage (input - process - output). A user interface is needed for this interaction to take place. Jung and Yim (2015), in their study examining the effect of the user interface on the user-computer interaction, concluded that the applications

in which the interaction and learning are easy and with a user-friendly interface have a higher usability perception. The functionality of this interface has a direct impact on data and information entry into the system. This effect is achieved through two features of the interface: "Design" and "Active Update".

One of the most important points to be considered in the interface design of the DSS to be developed in schools is that the data come from a reliable source. To achieve this, the system prevents uncontrolled, unproven, or incomplete data or information from entering the process phase. In addition, the customizable areas that users try to access and operate in this interface will make the use of the interface more efficient. Users will be able to customize and group the connections where their work is constantly done, so that they will not waste time on functions that are not related to their work. When the literature on the subject is examined, many studies (Thomas, 2000; Hu, Ma and Chau, 1999; Lohse and Spiller, 1998) show that user interface design is directly effective in saving time for users and reducing the possibility of making mistakes.

Table 2.

Systems and Features of the Described Model

	UPPER SYSTEM	SUB-SYSTEM	FEATURE
DECISION SUPPORT SYSTEMS IN SCHOOLS	EFFECTIVE USER INTERFACE	Design	Data Reliability
			Customizable Interface with Unordered Access
		Active Update	Proactive Agenda
			External Data Sources
			Instant Data Entry
	COLLECTIVE PARTICIPATION-BASED MONITORING SYSTEM	School Monitoring	Institutional Memory
			SWOT Analysis
			Physical Equipment
			Structuring and Decisions
		Teacher Monitoring	Academic Career
			In-Service Training
			Teacher Attendance
		Student Monitoring	Academical
			Orientation
			Student Affairs
			Psycho-Social Development
			Developmental Health Status
	STATISTICAL REPORTING	Situation Analysis	Flexible Reporting
			School Physical Equipment Reporting
			Education-Training Processes Reporting
			Comparative Reporting
		Predictive Reporting	Interpretation
			Guidance

Another important feature of the effective user interface is that it allows “Active Update”. In the open systems approach, a "Proactive Agenda" should be established on the decisions of repetitive work with the automation structure of DSS, such as reintegrating all or part of the respective output into the process as input.Thus, the system users will be able to learn about the routine works from the “Proactive Agendas” -which in a way act as an early warning system- and the process will be carried out without causing any loss of time or negligence. This approach is similar to cybernetic theory in one respect. Outputs are reintroduced into the system as inputs and the system develops an auto-control mechanism. The results of the study conducted by Kaban (1994) on general systems theory and cybernetics also support this finding. In the study, a definition of cybernetics that does not pacify people and whose subject is the individual has been reached. In addition, it is explained in the study that the purpose of cybernetics is to develop the individual and the automation system that enables the devices to do the repetitive tasks that occupy the individual's energy in vain. According to the model, each system user is also a data or information provider for the system. In this way, even the smallest information about the school, student or teacher will be able to be entered into the system by the users and everyone will be aware of this information at the same time. In this way, the school principal, vice principals and teachers will be able to follow the records kept about themselves, the school and the students. This will enable the development and spread of informal communication in schools, enriching communication channels and providing the time needed to communicate. Because, in Niehoff's (2010) study on information sharing in schools, it was pointed out that school principals communicate through peer sharing, especially informally, and time constraint was shown as the biggest communication barrier.

The second sub-model of the model, the “Collective Participation Based Monitoring System”, connects the "Effective User Interface” with the third sub-model, "Statistical Reporting", which is the output unit, thanks to the computer technology running entirely in the background. In this sub-model, which is the field where data or information coming from the input unit called "Effective User Interface" is transformed into knowledge, monitoring can be done on the three basic elements of the school, "School - Teacher - Student". The study results conducted by Akbaba-Altun (2000) clearly state why such a monitoring system is needed. According to the study, school administrators use information technologies for correspondence and keeping records. However, this technology can provide too comprehensive services to be used for such a shallow purpose. This sub-model is not a stage where the decision is made, but a stage where the data or information that will produce the meta-knowledge necessary for the decision to be made is classified and meaning is created, and thus knowledge is created.

In the “Collective Participation Based Monitoring System”, there will be an “Institutional Memory” of the school under the title of “School Monitoring”. This "institutional memory" is a component in which the past experiences of the school are shared and all wrong or right actions are recorded, both in terms of physical and educational processes. Gul and Ozden (2011) also drew attention to the function of this component of the model in their studies; They stated that institutional memory is an indispensable element for the

creation, storage, processing, and sharing of information within the institution. Thanks to this component, the rediscovery of America will be prevented and the continuity of institutions will be ensured. In periods when there is manager circulation, the new manager will be able to continue from where the previous manager left off. One of the features proposed in the model and presented within the scope of "School Monitoring" is the analysis of the school's strengths, weaknesses, opportunities, and threats (SWOT) of the school in the system. This analysis, which will be updated according to the changing conditions, will be an informative note for all school stakeholders. Ozan, Polat, Gunduzalp, and Yaras (2015) also examined the effects of SWOT analysis on school management in their studies and concluded that this analysis is necessary for the coordination of employees and an effective management process in educational organizations.

Another element of the "Collective Participation Based Monitoring System" of the presented DSS is "Teacher Monitoring". It is important for the future of the education system to transfer teachers' experiences into practice, eliminate the deficiencies, if any, and develop these experiences (Erturk, Altınkaynak, Veziroglu, & Erkan, 2014). This element was mainly about the educational and teaching processes, and they wanted to benefit from the teachers at the highest level.

The last subsystem of DSS revealed in the research is "Statistical Reporting". The data entered in the current management information systems remain in raw form, statistical analyzes are not included, so meaningful information cannot be produced (Erdogan, Aydin, Akın, & Demirkasimoglu, 2014). As the name suggests, this sub-system functions to obtain an output by transforming the data and information entered with the "Effective User Interface" into knowledge with the "Collective Participation Based Monitoring System". In addition, this subsystem provides feedback to the system to be reintroduced to the system, as in the open system approach. The "Statistical Reporting" sub-system, on the one hand, provides the creation of tangible indicative reports for the current situation analysis, on the other hand, it enables the production of comparative information about the situation by applying statistical analyzes to the quantitative data.

Therefore, this study presented a model for the conversion of the electronic services of the Ministry of National Education within the framework of management information systems to DSS. In the light of the opinions obtained from the research participants while explaining the model, it was seen that the existing management information systems have an inactive, passive, and inflexible structure. Making existing management information systems more efficient will be possible if the decision-making process, which is considered the heart of management processes, is based on concrete information. To achieve this, the DSS model in schools has been put forward as consisting of three sub-models titled "Effective User Interface", "Collective Participation Based Monitoring System" and "Statistical Reporting". This model, which has principles that overlap with the principles of the open system approach, has shown that; Although it has subsystems, DSS is a whole. The output of each subsystem is the input of another subsystem, and this model, with the help of statistics, will ensure that data and decisions in schools are based on concrete information and rationale.

Ethics Committee Approval: This research followed the protocols set by the Akdeniz University of the Ethics Review Committee (ERC). However, since the research was produced from the thesis of the author T.Y titled "Using the electronic services provided by the Ministry of National Education within the scope of management information systems as a decision support system: A grounded theory study" in 2017 and there was no need for ethics committee approval for doctoral theses in that year, ethics committee approval was not available for this study.

Informed Consent: Informed consent was obtained from the participants.

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Authors	*Contact*
Tayfun YORUK works as an assistant professor at Akdeniz University, Faculty of Applied Sciences, Department of Management Information Systems. He works in fields such as educational administration, educational technologies, distance education and human-computer interaction.	Assist. Prof. Dr., Akdeniz University, Faculty of Applied Sciences, Department of Management Information Systems, Campus, Antalya. E-mail: tayfun@akdeniz.edu.tr
İlhan GUNBAYİ works as a professor at Akdeniz University, Faculty of Education, Department of Educational Sciences. He works in fields such as educational administration, mixed research methods, qualitative research methods.	Prof. Dr., Akdeniz University, Faculty of Education, Department of Educational Sciences, Campus, Antalya. E-mail: igunbayi@akdeniz.edu.tr