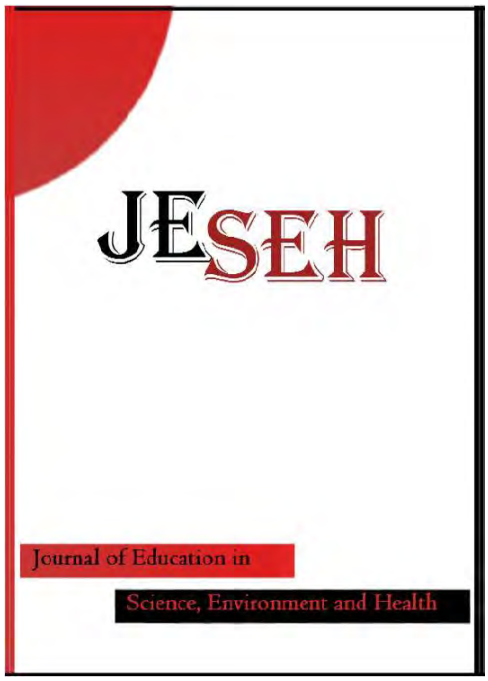

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Abstract

This study was carried out to determine the views of science teachers about the inclusion of epidemic diseases in science curriculum. Phenomenology, one of the qualitative research designs, was used as the research design in the study. The study group consists of six science teachers who have at least five years of experience and have participated in the development of science curriculum in previous years. A semi-structured interview form consisting of five questions, whose content validity was provided by taking expert opinion, was used as a data collection tool. Code, category and themes were created by analyzing the content of the teachers' opinions. As a result of the study, inclusion of epidemic diseases, which has become a current topic all around the world, into the science curriculum; reasons, advantages and disadvantages, class level, achievements that can be included in the program were evaluated according to the views of science teachers in terms of teaching methods-techniques and materials also it was emphasized that the subject of epidemic diseases should be included in the science course curriculum. Suggestions that in line with the findings of the research were made to the developers of the science course curriculum and researchers.

Introduction

The need for qualified and well-equipped manpower, which arises from the changing social needs in the light of developments in science and technology, can only be met with a qualified education. Therefore, curricula should be prepared in line with the requirements of the era, the needs of the individual and society, and should include innovations and advances in the fields they cover (Coşkun, 2017). In this context, curricula are being reviewed and renewed in many countries (Donnelly & Ryder, 2011, Ulutan, 2018). In the updated curriculum, a human-oriented education approach is adopted and it is aimed to train individuals to have 21st century skills (Çepni, 2017). The effect of science course is high in gaining these skills, which are necessary for increasing the quality of life of individuals and societies (Kaptan, 1999; Yılmaz, 2013). The science course aims to raise individuals who are open to development, have developed thinking skills, have strong social skills, and use information and technology effectively, and provides an opportunity to the student in order to comprehend and research himself and the environment he lives in through scientific methods and thinking (Akbaş, 2011; Rudolph, 2020). In this context, science curricula should be capable of adapting to the renewed world conditions in line with the changing social requirements with the developments in science and technology (Wiles & Bondi, 2002).

Science curriculums, in the light of the principle of inseparability of human and life, should be prepared in a way that will facilitate each individuals lives and contribute to a healthy and happy living is has been emphasized in the Ministry of National Education (MoNE) science curriculum objectives and MEB 2023 Education Vision Reports (MoNE, 2018a; MoNE 2023 Education Vision, 2018b). In this context, as in many countries, the science curriculum has been updated in order to prepare an individual and society-oriented curriculum in Turkey. In the science curriculum, which was updated twice in the last ten years, in 2013 and 2018, it was aimed to develop the basic life skills, life skills were included in the curriculum as a new skill area. One of the striking points in the updates made in 2013 and 2018 is the inclusion of socio-scientific issues in the program. In this way, it is aimed to make students gain the habit of scientific thinking and to make students aware of taking a role in the solution of social issues (MoNE, 2013; MoNE, 2018a). Socio-scientific issues attract the attention of students who are interested in daily life and social issues, encourage them to think. For this reason, the inclusion of socio-scientific issues in the curriculum is seen as one of the best ways to enable individuals to gain skills such as decision making, problem solving, analytical thinking and generating new ideas (Değirmenci & Doğru, 2017; Gologlu, 2009).

Socioscientific issues are controversial issues that require generating ideas and making choices in a personal or social sense, have local and general social and political dimensions, and are discussed from different perspectives in all societies. Socioscientific issues covered within the scope of science courses in Turkey; global warming, genetically modified foods, nuclear energy, ozone depletion, reduction of biodiversity, hydroelectric power plants, cloning, recycling of waste materials, etc. (MoNE, 2018a). It is stated that similar subjects are also included in studies on socioscientific issues in Turkey (Genç & Genç, 2017). It is inevitable that new subjects should be included in socio-scientific issues according to the conditions and needs of the developing world. In the MoNE 2023 Education Vision Report, it is stated that awareness and skill training on current health issues should be given importance in science course curriculum (MoNE, 2023 Education Vision, 2018b). Considering the inclusion of diseases in the 2018 Turkish science curriculum; at sixth grade, dwarfism, giantism, diabetes, goiter, sensory organ diseases, bone fractures, rheumatism, diarrhea, ulcer, cancer, jaundice, anemia, pneumonia, influenza, kidney stones, kidney failure, dialysis, alcohol, smoking, organ donation, first aid and health of receptor organs, and at the eighth grade concept of consanguineous marriage are discussed, but the issue of epidemic diseases is not among these said learning outcomes (MEB, 2018a). The content of the science program has been prepared by examining national and international academic studies and taking the opinions of the teachers who are the implementers of the curriculum. However, in the examinations made, it was determined that although some socioscientific issues were included in the 2018 science curriculum, the objectives were limited and the subject of diseases was not included enough (Deveci & Aydiz, 2021; Saraç & Yıldırım, 2019; Yapıcıoğlu, 2020). In this context, it is thought that the issue of epidemic diseases such as Covid 19, which has recently occupied the world in the field of health, which is included in the 2023 vision, should be included in science education programs as a socio-scientific issue.

The Covid 19 pandemic is a socio-scientific issue that affects the society at a high level, as the other socio-scientific issues, involves controversial situations with its applications in society and has the characteristics of different opinions among scientists. (Yapıcıoğlu, 2020). The Covid 19 epidemic emerged in Wuhan, China in December 2019 and has become a pandemic that has affected the whole world as of March 2020. Changes have been made in the functioning of many areas such as health, education, tourism, business sector and economy all over the world since 2020 due to the Covid 19 pandemic. With this disease, terms such as pandemic, symptomatic, asymptomatic, physical distance, SARS, virus, epidemic, immunity, vaccine, quarantine, isolation and ways of protection from viruses began to be heard frequently in all media, among politicians and scientists, in short in all areas of life these terms tried to understand. Thus, it has been revealed that the epidemic is a multidimensional health problem that touches every aspect of life and needs to be understood in different disciplines (Dillon & Avraamidou, 2020). There is no guarantee that the pandemic experienced today with Covid 19 will not be repeated with similar or different diseases in the future. According to Yapıcıoğlu (2020), this epidemic period "although it seems like a break from daily life in the world, it is actually an internship period in which efforts are made against the effects of a scientific event that is happening now and is predicted to happen in the future". The Covid 19 pandemic is a global socio-scientific issue, and scientific studies and discussions on the subject still continue. All individuals should take an active role in the solution of the global problem. In general, this shows that there are new needs in the field of education, especially in science curricula, in socio-scientific issues that concern all humanity, such as epidemics (Saunders & Rennie, 2013).

What is expected from individuals during the epidemic is, as a good science literate, to make sense of the explanations made by different sources, to distinguish between scientific and non-scientific views, to make decisions by evaluating socio-scientific aspects, to exhibit behaviors that take into account scientific results, and to take an active role in solving the problem that concerns all humanity (Holbrook & Rannikmae, 2009; Yapıcıoğlu, 2020). Dillon and Avraamidou (2020) in their study, in which they investigated how much science education programs prepared the society for the Covid 19 pandemic period, they claimed that although the importance of science literacy is often emphasized in science education programs, individuals are not science literate and described people's behavior during the pandemic process as science illiterate. In addition, in some studies evaluating cognitive skills on the subject of diseases, it has been determined that students have misunderstandings and misconceptions about this subject (Takmaz, 2019). In the studies, it is stated that the information sources of individuals are mostly from social media, and there is a lot of information pollution in the media and digital platforms that will expose the public to false beliefs and misconceptions (Konuk & Güntaş, 2019; Yapıcıoğlu, 2020). In this regard, schools have important duties to individuals in the process of making decisions by using high-level thinking skills in the light of scientific data and implementing them in their daily lives (Koçakoğlu, 2016; Takmaz & Yılmaz, 2020). Schools are preparation environment for life that are important for the healthy development of students academically, socially and emotionally (Erduran, 2020; Follari & Navaratne, 2019; Şirin, 2020; Taneri & Kılıç, 2020). As a matter of fact, the education programs that implemented in schools aims to contribute to the solution of social problems (Coşkun, 2017). In this direction, it is of great importance that teachers and students have knowledge about a subject such as epidemic diseases that

seriously affect the whole world, considering the place and role of the teacher and student in society (Hacettepe University, 2017; İnceoğlu, 2004; Köse & Demir, 2014; Meşeci, 2008; The sun, 2020).

The emergence and subsequent developments of the Covid-19 pandemic, which encountered all over the world, the danger of epidemics and the changes and developments in vaccination methods reveal that the acquisitions related to epidemic diseases should be included in science teaching programs. Including the subject of epidemic diseases in science education programs like other socio-scientific subjects will contribute to the development of individuals' judgment and decision-making skills by confronting individuals with some scientific, moral and ethical dilemmas (Yapıcıoğlu, 2020). This situation requires that today's education programs be planned in a way that will form the basis for raising responsible, conscious and sensitive citizens of the future (UNICEF, 2020). In this context, science education programs should comply with the requirements of the age and meet the needs of the individual and society (Koçakoğlu, 2016; Takmaz & Yılmaz, 2020). In order to evaluate the curriculum in terms of functionality in the planning process, it is considered important and necessary to get the opinions of teachers who take an active role in the implementation of the curriculum (Handal & Herrington, 2003; Karaman & Karaman, 2016; Özcan et al., 2018; Saraç & Yıldırım, 2019; Takmaz, 2019). In this context, national and international academic studies on education and training programs are examined and opinions are taken from teachers (MoNE, 2018a). In some studies, in which the opinions of teachers on the curriculum were taken, it was concluded that the objectives related to socio-scientific issues in the updated 2018 science curriculum did not find enough place among the achievements at some grade levels (Coşkun, 2017, Demirci Güler & Açıkgöz, 2019; Deveci, 2018; Deveci & Aydiz, 2021; Kalemkuş, 2021; Özcan & Koştur, 2019; Saraç & Yıldırım, 2019; Yapıcıoğlu, 2020).

In the literature review, it is seen that there is a limited studies on the inclusion of epidemic diseases, which gained importance with the Covid 19 epidemic, in the curriculum. In this context, Yapıcıoğlu (2020), in his study to examine the Covid 19 pandemic as a socio-scientific issue in science education and to offer model application suggestions for science teaching, examined why “Covid 19” is a socio-scientific issue and presented examples of applications such as cartoons, dilemma cards and problem scenarios that can be used in teaching this subject in science programs. Although this study contributes to science teaching with applications that can be used in teaching the subject of epidemic diseases, there is a need for new studies on teaching approaches and course materials that can be used in the teaching of socioscientific issues in science courses (Genç & Genç, 2017; Tyrrell & Calinger, 2020). It is thought that the data obtained with this study will contribute to the arrangement of the to be updated science curriculum and It is thought that it will contribute to the academic studies in the field of science curriculum in terms of interview questions and emerging findings.

In this study, it is aimed to reveal the views of science teachers working in Turkey about the inclusion of epidemic diseases in science curriculum. In line with the purpose of the study, the research question was determined as "What are the teachers' views on the inclusion of epidemic diseases in the science curriculum?"

Method

Research Design

In this study, phenomenology was used as a research design. Phenomenology provides a suitable ground for the investigation of phenomena that individuals are not completely unfamiliar with but at the same time cannot fully grasp. The phenomenology design focuses on phenomena that are awared of but do not have in-depth knowledge about (Yıldırım & Şimşek, 2016; Creswell, 2007).

Working Group

The participants of this study were determined by purposeful sampling methods. Purposeful sampling method is a type of sampling that emerges in qualitative research and allows many events and phenomena to be discovered and explained. (Yıldırım & Şimşek, 2016). Purposeful sampling allows for in-depth study of events that are assumed to contain rich information. In purposeful samples, researchers select participants according to their characteristics suitable for the purpose of the research. Participants can be selected in this sample type because of their experience in the subject studied or their knowledge of the subject studied (Patton, 2002). In this study, criterion sampling, which is one of the purposeful sampling types, was used. The criterion sampling method is aimed at studying situations that meet a predetermined group criterion (Yıldırım & Şimşek, 2016). In criterion sampling selection, the criterion that meets the situation studied is determined by the researcher or the

appropriate one is selected from the prepared list of criteria (Marshall & Rossman, 2014). Any situation or event that is included in the subject of the research can be determined as the criterion of the study (Grix, 2010). The criterion in this study, in accordance with the purpose of the research, is that the sample consists of science teachers with a certain experience. In this direction, the sample of the study consisted of six science teachers who had at least five years of experience and were involved in the development of science curriculum in previous years. The reason why the experienced teacher is the criterion while determining the sample is that the teachers have knowledge about the recently updated science course curriculum. The reason for choosing the teachers involved in the science curriculum process is that teachers who have previously gained experience regarding to new updates in the curriculum are thought to have rich knowledge.

In order to determine the teachers to be included in the study, 10 teachers were interviewed at first and the teachers to be included in the study were determined according to the results of that interview. During the interview, the teachers were asked how many years of professional experience they have and whether they participated in the preparation of science course curriculum or undergo any information training. As a result of the interview, six teachers, two women and four men, who had at least five years of experience and were involved in the curriculum development process, formed the sample of the study. Demographic information of the working group is shown in Table 1.

Table 1. Demographic information of teachers participating in the study

Participants	Gender	Professional Experience	Training in Program Development
P1	Male	19 years	Master's, development study of 2013-2018 science course curriculum
P2	Male	13 years	Introduction of 2018 science course curriculum
P3	Female	11 years	Development study of 2018 science course curriculum
P4	Male	22 years	Introduction of 2018 science course curriculum
P5	Male	16 years	Master's, development study of 2013-2018 science course curriculum
P6	Female	9 years	Introduction of 2018 science course curriculum

Data Collection Tool

As a data collection tool in the study, a semi-structured interview form was used to determine the opinions of teachers about the inclusion of epidemic diseases in the science curriculum. In phenomenological studies conducted to reveal and interpret the perceptions of individuals about a certain phenomenon, generally interview questions are used (Fraenkel & Wallen, 1993). Interviewing provides the participants with the opportunity to express their thoughts on a determined subject in a more detailed and a deeper way (Çepni, 2012). In this study, interview questions were included in the collection of data in accordance with the design and purpose of the research.

The interview form was created by the researchers. The interview form consisting of five questions was asked to two research associates who are experts in the field of science education, two science teachers and one Turkish language teacher, and it was rearranged after the received feedbacks. In this context; In line with the opinions of the science education specialists, “Do you think it is important to have knowledge about epidemics? question was added to the interview questions; After the feedbacks received from the science teachers and the Turkish language teacher, the question “Do you think there are advantages and difficulties in including the subject of epidemic diseases in science curriculum?” was changed to “Do you think it would provide an advantage or disadvantage to include the subject of epidemics in science curriculum?”. The interview form which consists of six questions is finalized with the arrangements made after the feedback received.

Interview Questios:

1. Do you think it is important to be informed about epidemics?
a. If your answer is yes, explain the reason by evaluating it from the perspective of the teacher and the student.
b. If your answer is no, explain why.
2. Do you think that school is important for students to have knowledge about epidemic diseases?
a. If your answer is yes, explain why.
b. If your answer is no, explain why.

3. What do you think about the inclusion of epidemic diseases in science curriculum?
a. If you think it is necessary to include this subject in the program; Evaluate in terms of achievement, content, grade level and time (beginning, middle or end of the semester).
b. If you do not think it is necessary to include this topic in the program, explain why.
4. Do you think it would be advantageous to include the subject of epidemic diseases in science education programs?
a. If yes, what are these advantages?
b. If your answer is no, explain why.
5 Do you think it would be disadvantageous to include the subject of epidemic diseases in science education programs?
a. If yes, what are these disadvantages?
b. If your answer is no, explain why.
6. How do you think the subject of epidemic diseases should be taught effectively if it is included in the science curriculum?
a. Evaluate in terms of teaching/learning method.
b. Evaluate in terms of teaching material.

Data Collection Process, Validity and Reliability

It was stated to the science teachers in the study group before the interview that the interviews would be recorded and the records would only be used by the researchers. Interviews were held online via Zoom and each interview lasted approximately 20 minutes. The audio recordings were documented. In order to ensure internal validity in the study; a long-term interaction was ensured between the researcher and the participant, after the audio recordings taken at the end of the interview are documented, the participant's confirmation was obtained by allowing them to be read again by them, direct quotations were included in the findings section. In order to ensure external validity; purposeful sampling was made and the sample was selected suitable for the research topic of the study, the data obtained at the end of the study were described in detail and analyzed in depth. In order to ensure internal reliability; the codes, categories and themes created for the data obtained from the study were reviewed by two science education experts and a consistency analysis was carried out, in the findings section, the data was presented without any comment. In order to ensure external reliability, the data obtained from the study were compared with the raw data by two science education experts and a confirmation survey was made.

Data Analysis

The data obtained as a result of the interviews with the science teachers were analyzed by content analysis. Inductive analysis, which is one of the content analysis types, was used in the analysis of the data obtained within the scope of the research (Yıldırım & Şimşek, 2016). The main purpose of content analysis is to reach the concepts that will fully explain the obtained data and to establish relationships between them (Miles & Huberman, 1994). For this purpose, first of all, the data obtained from the participants' opinions were examined and codes were created. Afterwards, the similarities and differences of the codes were examined, and the related codes were brought together to determine category and themes. While doing content analysis, the transcripts were first examined by one of the researchers and the codes, categories and themes based on the data were determined, then the transcripts were revised by two science education specialists and the codes, categories and themes were rearranged accordingly. The four themes determined as a result of these arrangements are given in Table 2.

Table 2. Themes created by data analysis

Theme Number	Theme
1	The Role of School, Teacher and Student in Having Knowledge on Epidemics
2	Reasons, Advantages and Disadvantages of the Inclusion of Epidemic Diseases in Science Curriculum
3	Suggested Outcome Contents, Grade Levels and Term/Unit to Include Epidemic Diseases in Science Curriculum
4	Teaching Methods and Materials of Epidemic Diseases Subject

Results

The findings of the research were obtained from interviews with science teachers who participated in curriculum development trainings and had at least five years of experience. The codes created as a result of the analysis of the data obtained from the interviews with the teachers were collected under four different themes and presented in the form of tables.

The First Theme: The Role of School, Teacher and Student in Having Knowledge on Epidemics

In the study, the participants were asked to evaluate the roles school, teacher and student in having knowledge about epidemic diseases. The categories, codes and the distribution of participants, which was created by considering the data obtained in this context, which created accordingly to the theme of *"The Role of School, Teacher and Student in Having Knowledge on Epidemics"* are given in Table 3.

Table 3. The Role of School, Teacher and Student in Having Knowledge on Epidemics

Categories	Codes	Participants
The role of school	Reliable source of information	P1, P2, P3, P5, P6
	Effective force	P1
	Problem solving environment	P1
	Primary source	P1
	Widespread influence	P1
	Effective teaching/education environment	P2, P3, P6
	Effective communication environment	P4
	Long time frame	P6
The role of teacher	Education leader	P1, P2, P3, P4, P5, P6
	Role model	P1, P4
The Role of student	Conscious individual	P1, P2, P3, P5, P6
	Widespread impact	P1, P2, P3, P4, P5

The majority of the teachers think that the school has an important place in having knowledge about epidemic diseases because it is a source of reliable information. P2 expressed his thoughts on this subject, "*The most accurate resource will be the school here. The media may not be an accurate enough source or there may be very different predictions and opinions. Not every information on the media, on the television, is correct. That's why it's very important for them to learn at school*". P3 expressed his opinion in support of P2's view, "*...I think the true knowledge is learned at schoo*l". In addition to this, participant P1 thinks that the school is important because of "effective force", "problem solving environment", "primary resource" and "widespread influence". P1's thought on the school being an effective power, "*You can gather millions of children and give education to them at the same time in institutions we refer as schools. This is actually a very powerful force. In other words, imagine that you are providing education to 15-16 million students living in Turkey at the same time. Imagine training them at the same time and on the same day, and that's 48 million when 16 million go to their home and at least tell these into two person. When you compare it to this population, this is a very large and rapid determination, which is really the place for schools, why schools are important in terms of another aspect of this, that is, the speed of this work is important in terms of improving maneuverability immediately*." While expressing his opinion, he also touches the subject "widespread influence" as following: "*Education from schools spreads to the environment. It is a spiral, in this respect, it can spread to the environment, that is, the child goes home, tells it to parents at home, tells it to the neighbor, it spreads like this and becomes effective*". While P2 referred to the school as an effective teaching environment, P3 and P6 drew attention to the school's being an educational environment. P3 made a statement for the educational environment, "*School is not just a teaching place. The minister of national education and training, that is in the name, is not teaching its actually education. Education means a place where we can learn not only information about courses but also the whole social life*." While P4 expressed the importance of effective communication at school, P6 stated that it has an important place in this regard due to the time period the student spends at school. On this subject, P6 expressed his opinion as, "*If we consider the process he spent from the age of 5-6 until the age of 17-18, he spends more time at school than at home. He needs to learn this at school or he should have knowledge about it at school*".

The science teachers have opinions about the "education leader" and "role model" codes of the teachers regarding the "The Importance of Having a Knowledge about Epidemics for Teachers" (Table 3). All of the participants think that teachers should have knowledge about epidemic diseases due to their profession. In this context, his opinion of P1 on the education leader code is, "*Teachers are a professional group that can*

penetrate into the smallest capillaries in societies. That's why, because we educate people's children, children can spread about the information about epidemic disease that we teach them by telling their families, neighbors, relatives, elders and minors at home." In addition to these, P1 and P4 think that teachers should have knowledge about this subject in order to be a positive role model in society. P4's opinion on this issue is expressed as, "*I think we need to have detailed information about the epidemic in order to protect ourselves, protect our students and be a positive role model for the society*."

The teachers expressed their views on the codes of "conscious individual" and "pervasive influence". Five of the participants think that students should have knowledge about epidemic diseases in order to be conscious individuals. In this regard, the participants emphasized the contribution of the conscious individual to the formation of a conscious society. For example, P4 thought, "*You know, each student means a family. The cornerstone of society means that the better we explain these to our children, and the better we can teach them in the desired direction, that is, in the educational dimension, they teach their families. If their families are educated, what will the society do, they will be more conscious*", while in P5 "*Learning this and raising awareness about it will cause such epidemics to be prevented before it spreads in a much shorter time, I think. In the future, they will know and apply to their lives, they will grow up, they will raise their children themselves accordingly*". Five of the participants agree that students' knowledge about epidemics will have a widespread effect on society. Regarding the widespread effect, P2 said, "*If the student has information on this subject, he will have an impact on the people around him, his family, I don't know, his friends around him. The student is actually a light of the environment, in my opinion, the building of the environment. It will also illuminate the environment somehow. That is why it is very important for students to have knowledge about this issue*".

Second Theme: Reasons, Advantages and Disadvantages of the Inclusion of Epidemic Diseases in Science Curriculum

The categories, codes, and the distribution of participants regarding these codes are given in Table 4 under the theme of "*Reasons, Advantages and Disadvantages of the Inclusion of Epidemic Diseases in Science Curriculum*", which was formed by taking into account the reasoned opinions of science teachers regarding the inclusion of epidemic diseases in science curriculum.

Table 4. Reasons, advantages and disadvantages of the inclusion of epidemic diseases in science curriculum

Categories	Codes	Participants
Reasons	Raising a conscious generation	P1, P3, P4, P5, P6
	Topicality	P1, P3
	Socio-scientific issue	P3
	Daily life relationship	P2, P4
	Early education	P4
Advantages	Reliable knowledge	P3, P6
	Social awareness	P1, P2, P4, P5
	Widespread effect	P2, P3
Disadvantages	Increasing the number of learning outcomes	P1
	The teacher can share his/her opinion	P3
	Some learning outcomes may be deducted.	P5

P1, P3, P4, P5 and P6 think that epidemic diseases should be included in the science curriculum in order to raise a conscious generation. P5's thought on this subject was, "*It should be. Of course, the most important factor here is science learning and teaching, raising students' awareness, but the best course to explain the reasons and studies related to them is science courses*." P1 also thinks that the science course should cover the issue of epidemics because science course is up-to-date information. P1 thinks that "*Science course is a course that follows the current. For example, based on the recent developments in the world on space, our ministry of national education has reflected the space subject in the programs of 6, 7, 8. grades*". P3 stated similar to P1 that current issues should be included in the science course, and also expressed that the issue of epidemic diseases should be included in the curriculum because it is a socio-scientific issue. P3 expressed this opinion as, "*Actually, we try to include all global problems and social problems in science educational books and curriculum. We see applications such as recycling, global warming, genetic engineering, biotechnology as a whole in science books, which are actually current and socioscientific issues. That's why the issue of epidemic diseases related to this sudden pandemic should be placed at grade levels and in relation to other subjects definitely included in the program*". P4 of the participants explained their views on the need for the subject of epidemic diseases to be included in the science course based on the contribution of the science course to daily

life and educating the individual at an early age. P2 expressed as, "*I think that the importance of this has been understood much more after the covid disease. Because I attend the classes of the 5th, 6th, 7th, 8th grades, science lessons are not given detailed information about other diseases, even measles, typhoid or cholera, let alone epidemic diseases. In other words, there is no information that we can explain the essence of many issues related to infectious diseases, epidemics, yes, infectious diseases*".

In Table 4, it is seen that some of the science teachers think that the inclusion of epidemic diseases in science teaching programs will provide an advantage in terms of reliable knowledge, social awareness and widespread impact. Referring to the advantage of the teacher's role in sharing relable knowledge, P6 expressed as, "*If this subject is included in the program, at least they will have learned the information from the right place. Maybe the teacher is not the one who conveys the information directly, but the one who guides in learning the information. In this way, correct information can be provided to students through teaching*". P2 made a statement for social awareness and widespread impact as, "*Children are at the center of learning. Since children sits in the center for teaching to the environment, I think that if these topics will include in our programs and if we can explain them in a really good way and teach them to the children, we can increase the awareness of this society*". P1 stated referring to the advantages of social awareness as, "*Scientific literacy is important here. In such events, it is to our advantage to give this education in the science curriculum in order to read the scientific course of the event and to predict how it will progress scientifically*".

The participants' views on the disadvantages of the inclusion of epidemic diseases in the science course curriculum are limited (Table 4). While P1 of the participants stated that adding the subject of epidemic diseases to the programs would increase the number of achievements as a disadvantage, P3 thought that it would be a disadvantage for the teacher to share his/her own opinion because the subject of epidemics is a socio-scientific subject. P3 expressed this thought as "*It may be a disadvantage for the teacher to share his/her own opinion, that is, an opinion of his/her own, not the information*". Thinking that it might cause elimination of some attainments, P5 said, "*For example, plate movements were telling before that. Not at the moment, for example, we put the climate instead. When we are talking about the occurrence of an earthquake, we explain what an earthquake is without telling about destructive natural events. You know, it's just a wobble, something is destroyed and you can see them, I think it was good, but now it has been eliminated, so adding topics might be a disadvantage since it may cause some topics to come out*". Participants P2, P4 and P6 stated that inclusion of epidemic diseases in science education programs would not cause any disadvantage.

Third Theme: Suggested Outcome Contents, Grade Levels and Term/Units to Include Epidemic Diseases in Science Curriculum

The categories, codes and the distribution of the participants for the theme of "*Suggested Outcome Contents, Grade Levels and Term/Units to Include Epidemic Diseases in Science Curriculum",* which was formed with opinions of science teachers, are given in Table 5.

Table 5. Outcome contents, grade levels and term/units to include epidemic diseases in science curriculum

Categories	Codes	Participants
Suggested outcome contents	Ways to avoid epidemics	P1, P2, P3, P5, P6
	Definition of epidemic disease	P3, P4, P5, P6
	Ways of spreading epidemics	P1, P3, P6
	History of epidemics	P1, P5
	Effects of epidemics	P5, P6
	Treatment methods of epidemic diseases	P1, P4
	Vaccine	P1, P3
	Virus and mutation	P3
	Causes of epidemic disease	P4
	The importance of epidemics	P5
Suggested grade levels	All grades from kindergarten	P4
	from 1 to 8	P1, P2
	from 5 to 8	P3, P5, P6
Suggested term/unit	First semester unit	P1, P2, P3, P4, P6
	According to the relationship status with current learning outcomes	P3
	After the subject of systems and living things	P5

The majority of the participants think that the concept of ways to protect against epidemic diseases should be included in the learning outcomes. P2 made a statement on the ways of protection from epidemic diseases as, "*Paths of prevention from diseases for each class level. You know, the mask distance and cleaning issues we are talking about can be given in a little more detail. Maybe we can emphasize that the cleaning habit that we always try to gain is more important here*". After this suggestion, the most frequently mentioned concepts are the definition of epidemic disease and the ways of spreading epidemics. P3 on her view of the ways in which epidemics spread as, "*What is a mask, how is it used? Who does it hurt when it goes under the nose, why do we have to close our mouths? For example, we can teach this, we can teach that the virus is transmitted through droplets*". Two participants each think that the history of epidemic diseases, the effects of epidemic diseases, treatment methods of epidemic diseases and vaccine concepts should be included in the learning outcomes. P3's explained her opinions on these as, "*My opinion is that keeping general hygiene in the first stages a learning program and the history of epidemic diseases as general rules and from the fifth grade on, including how the course of epidemics progresses should be made by a scientific commission based on the data obtained in the light of scientific facts and scientific articles and theses by from*". In addition to these, P3 stated in the concepts of virus and mutation, P4 stated causes of epidemics, and P5 stated the importance of epidemic diseases and whether it should be included in the learning outcomes. P4 expressed his opinion on this subject as, "*First, the child should be given a definition of the disease, the factors that cause the disease should be explained, what can be done for the treatment of the disease and what are the technological developments used in the treatment of the disease? Content suitable for that class can be prepared at each grade level and these can be taught in the lessons*".

In Table 5, when the answers given by the science teachers regarding the grade levels recommended to be included in the curriculum of the epidemic diseases are examined, it is seen that the opinions on the codes of "all classes starting from kindergarten", "from 1 to 8", "from 5 to 8" are appears to have arisen. P4 stated that these codes should be started from kindergarten and expressed as, "*It should even be started from pre-school, because a tree bends when it is wet. The child will make it a habit and you know that habits in us need to be repeated a lot in order to fit together, and it is much easier for young children to gain such habits. You know, as the individual gets older, it becomes difficult to gain this*". There are three participants who think that it should be given from the fifth to the eighth grade. Among them, P5 stated as, "*These should be given from the fifth grade. Then, sixth grade and seventh grade will of course learn about cells. They will learn the subject of living things, in the fifth grade, they will learn cells and systems in later subjects. Therefore, after these subjects are covered, especially after the biology subjects, they learned about the epidemic diseases such as the cell, they learned about the living things, what kind of creatures they cause epidemics in us, what can be done to prevent such epidemics should be given*".

The science teachers have suggestions regarding the term/unit recommended to be included in the science curriculum such as "first semester first unit", "according to the current learning outcomes", "after systems and living things". P3 suggested that the first unit should be in the first semester: "Actually, the beginning of the semester seems to be more appropriate for this. It can be integrated into a subject at the beginning of the semester, because a learned subject can be talked about for a year." While P1 states, "*If the issue of epidemics is given to our children, especially at the beginning of the year, maybe in the first units, we can prevent our children from getting sick as a result of our children knowing the ways of infecting each other throughout the year when we teach them the importance of washing their hands and using cologne, or not using each other's private belongings*." P5 expressed this while stating that the topic of epidemics should be given after the topic of systems and living things, as "*I think the topic of epidemics can be added to the end of the topic of systems and living things in a spiral way as an outcome as 5,6,7 learned the topics*".

Fourth Theme: Teaching Methods and Materials of Epidemic Diseases Subject

The categories, codes and distribution of participants for the theme of "*Teaching Methods and Materials of Epidemic Diseases Subject*", which was created in line with the views of science teachers on the methods and materials that can be used in the learning of the subject of epidemic diseases, are given in Table 6. All of the participants think that the case study method can be used in learning the subject of epidemic diseases. P2 expressed this thought as, "*It may be that someone who has experienced this event, who has gone through this epidemic disease process, comes to the class and somehow tells what happened to them*." P3 and P6 of the participants think that the project method can be used. P3 expressed his opinion on the project as, "*We can even carry it out of school in order to raise awareness of the benefits of the vaccine. In other words, we can make this promotion in nursing homes and social places. I think that with this kind of project, teaching can be much more enjoyable and permanent*". P2 and P5 presented the expert invitation technique as a suggestion. P5 expressed

his opinion as, "*The doctors living in this period can be very important, I think they can come and give seminars at schools and tell their experiences*". P5 also thinks that the experimental method can be used. P3, who had a similar view with P5 about the test method, expressed his opinion as, "*For example, we can test how the mask prevents a droplet, we can put a cotton ball on the outside, we can show that it does not settle at the cotton, with such activities*". Some of the participants think that scenario writing, discussion, drama, problem solving, observation, role playing, research analysis, simulation and demonstration methods/techniques can be used in the learning of the subject of epidemics.

Table 6. Teaching Methods and Materials of Epidemic Diseases Subject

Categories	Codes	Participants
Teaching methods	Case study	P1, P2, P3, P4, P5, P6
	Project	P3, P6
	Expert invitation	P2, P5
	Experiment	P3, P5
	Writing a script	P1, P6
	Discussion	P1, P3
	Drama	P2, P6
	Problem solving	P3, P6
	Observation	P4, P6
	Role playing	P2
	Research review	P4
	Simulation	P4
	Show	P5
Teaching materials	Video	P1, P2, P3, P4, P5, P6
	Picture/Photo	P4, P6
	Printed materials	P3, P4, P6
	Real object	P5
	Slide	P4

Six participants think that videos related to epidemic diseases can be used as material. P6 thought that documentary films could be used as material and explained as, "*For example, if they watch a documentary that tells a story about the process of an epidemic, maybe it will be a more effective learning*". P1 expressed this opinion as, "*For example, when we sneeze, why should we sneeze into the elbow? Animation can be developed on such topics. Animations can be developed that can see the bacteria and viruses on the hand with animated or ultraviolet rays between washing our hands for five seconds and ten seconds with soap for five seconds and washing our hands for 30 seconds, depending on the extent of the effect or the importance of ventilation or how well it effects an area when we open the door or the window*". P4's opinion on the printed materials proposal was, "For example, a good set of posters can be made or promotional books can be made and sent to families".

Discussion

This study was carried out to evaluate the views of science teachers about the inclusion of epidemic diseases in the science curriculum. As a result of the data analysis, the case of inclusion of epidemic diseases in the science curriculum was examined under four themes. Schools are teaching and learning environments where teachers and students are together. When we look at the opinions of teachers about the importance of school in having knowledge about epidemic diseases, reliable knowledge source, effective power, problem solving environment, primary source, widespread effect, effective teahing and educationa environment, effective communication environment and the concepts of long time period become prominent. According to Martin, Tett and Kay (1999), schools have an effective structure in preparing individuals for life as well as learning new information, and school and community elements are complementary elements. According to Follari and Navaratne (2019), the primary purpose of school education is to enable students to develop a positive tendency towards learning and develop ability to apply what they have learned. Saban (2008) researched metaphors for school and reached the metaphors of information and enlightenment, guiding and guiding metaphors about school, similar to the results of this study. In addition to being a place of information and guidance, schools also have the task of creating an important environment for promoting wellness (Bentsen et al., 2020). According to Erduran, (2020), students need to understand not only what scientists do, but also how science relates to school lessons, in order to understand a complex subject like the pandemic. According to Taneri and Kılıç (2020), schools are one of the most important environments where students can access the right attitudes and behaviors during epidemics. The studies and the results of this study show that schools are the most effective primary source where students

reach the reliable knowledge and prepare for life. Schools have an important place in providing reliable information on a subject that is closely related to the society, such as epidemics, and make students to experience what they have learned.

With the views of the teachers in the research on the role of teacher in having knowledge about epidemic diseases, it was seen that the concepts of education leader and role model become prominent. Teachers have an important role in shaping the society by raising individuals who are the future of society. It is an indispensable fact that the behaviors of teachers, who are role models for students, are taken as an example by students (İnceoğlu, 2004). Köse and Demir (2014) revealed in their study that teachers impressing the students as role models. The social status of the teaching profession changes over time. However, the teaching profession is a respected profession that plays an active role in the personal, social and academic development of individuals and societies and the development of countries, and has important effects on the transfer of social and cultural values to new generations (Hacettepe University, 2017; Öztürk, Bilir, Uslu, Çalıkoğlu & Çağatay, 2018). In this context, it is very important to have a good education policy in order to strengthen the status of the teaching profession.

Considering the role of student in having knowledge about epidemics diseases, opinions about the students' growing up as conscious individuals and having a widespread effect have emerged. The student can maintain the skills and behaviors he has acquired in school in his life outside of school and in his future life (Meşeci, 2008). In this context, it is important for a student to grow up as a conscious individual in his life outside of school and to transfer this to his environment in terms of the student's role in society. According to the news of National Geographic News, 10-year-old British Tilly Smith while playing on the beach in front of the hotel where they stayed as a tourist in Thailand, he predicted the tsunami caused by the earthquake that occurred in the Indian Ocean on December 26, 2004, and saved about 100 peoples lives around him with the information he learned in geography class and the warnings he made accordingly (Owen, 2005). According to the report, when the tsunami occurred, the student, who was on vacation with his family, realized that the tsunami would come from the movement of the waters while on the beach, and ensured the evacuation of the hotel he was in and saved the lives of the people around him. (The sun, 2020). This news also shows that students have the potential to have a widespread impact by transferring what they have learned. It is thought that a student's knowledge about epidemics is a necessary condition for the student both to raise awareness about these diseases and to share what they have learned with others.

When the reasons for the inclusion of epidemic diseases in the science curriculum are examined according to the views of the teachers, ideas about raising a conscious generation, up-to-dateness, socio-scientific topic, daily life relationship and education at an early age are revealed. Due to its nature, the science course has a quality that sheds light on current issues. It is an important requirement to include current events in the science curriculum in order for students to keep up with the renewed world, because students can access current issues through the curriculum offered (Drake et al., 2014; Taber & Akpan, 2017). The issue of epidemic diseases has become current all over the world with Covid 19 and has gained a socio-scientific character. According to Yıldız (2014), epidemics have existed since ancient times, but societies are not aware of the epidemics. However, it is very important for students to have some prior knowledge of the relevant subjects so that they can reasonably understand the epidemics and act consciously. As stated by the participants, the subject of epidemic diseases is not among the current science curriculum achievements. For this reason, it is an important need to raise public awareness of epidemic diseases, which are suitable for the nature of the science course and have a vital importance, as a socio-scientific subject in the science curriculum. Similarly, Yapıcıoğlu (2020) emphasized in his study that it is important to include the Covid 19 pandemic period in teaching programs because it has a socio-scientific quality. Pietrocola et al. (2021) also emphasized in their studies that the roles of science education should be considered in the education of individuals with the Covid 19 pandemic. Karakuyu and Can (2020) also stated in their studies that science teaching programs should be revised according to the dynamics of life in an applicable way. Also, it is easier to transform the information learned at an early age into behavior, and the education received at an early age forms the basis for the behavior of the individual in the future (Bredekamp, 2015; UNICEF, 2003). For this reason, it is important to give the training for the behaviors desired to be gained to the individual as early as possible.

When the answers given by the teachers regarding the advantages of including the epidemic diseases in science teaching programs are examined, it is seen that the concepts of sharing reliable knowledge, providing social awareness, ensuring widespread influence. The courses in schools are learning environments that play an important role in transforming scientific knowledge into practice and helping students reach reliable information (Takmaz & Yılmaz, 2020; Taneri & Kılıç, 2020). Similarly, in Afacan (2011)'s study, aimed to science lesson in a similar way with metaphors of, facilitating life, enlightening scientifically and guiding with teacher's guidance

become prominent. According to Deboer (2000), all individuals need to adapt to scientific changes, whether they are dealing with science or not. Science education is a way of increasing the quality of social life, apart from preparing individuals for specific scientific professions. Individuals with a good science education and science literacy can understand the relationship between science, technology and society, apply the information they learned theoretically at school in their daily life, and use their ability to make decisions on issues that concern society (Çepni et al., 2003). In this respect, considering that the issue of epidemic diseases is a subject that should be explained scientifically and that concerns the society, it is obvious that it will be advantageous to include this subject in the science curriculum. In addition, teachers who think that the inclusion of this subject in the curriculum may also provide a disadvantage, have put forward ideas that the number of learning outcomes will increase and that teachers may make wrong interpretations about epidemic diseases. However, considering the advantages that can be taken from of such an important subject, it is thought that it would be a good decision to minimize the effects of these disadvantages and to include the subject of epidemic diseases in the science curriculum.

If the subject of epidemic diseases is included in the science course curriculum, when the contents of the learning outcomes that can be included in the program are asked to the teachers, the following views that should be included become prominent, the ways of protection from epidemic diseases, the definition of epidemic disease, the ways of spreading epidemics, the history of epidemic diseases, the effects of epidemic diseases, the treatment methods of epidemic diseases, vaccine, virus, mutation , the causes of epidemics and the importance of the epidemic diseases. The results contain evidence that teachers have difficulties in deciding what should actually be included in the curriculum regarding the teaching of epidemics. Even in a small and selected sample, participants state that different content should be included in the teaching of epidemics. Epidemic is a multidimensional socioscientific issue with a wide content, controversial situations, where there may be disagreements (Yapıcıoğlu, 2020). Therefore, it is not surprising that participants have different views on this issue. In this direction, if the subject of epidemic diseases is included in the science course curriculum, it is thought that it will be right to focus on the content that individuals are trying to make sense of. Similarly, Dillon and Avraamidou (2020) stated in their study that the issues of virus, pandemic, epidemic, quarantine, symptom, and social distance often become top in the agenda in the society and individuals are trying to understand these concepts. Considering in terms of science lesson, what is expected from individuals is while being a good science literate writer, to make sense of the explanations made for these concepts in their own minds and to pass them through a scientific filter (Yapıcıoğlu, 2020).

Teachers have expressed opinions about the class level where epidemic diseases can be included in the curriculum, starting from the kindergarten, first grade and fifth grade. There are differences of opinion among the participants about the class level where the topic of epidemic diseases will be included. This data reflects the difficulty of teachers themselves to define it. The fact that epidemics are a socioscientific issue may be a reason for this. However, each participant provides reasonable justification for their proposed grade level. The participants, who stated that it should be included from kindergarten, explained the reason for this as that it would be easier to transform the information learned at an early age into behavioral acts. Some participants explained their reasons with the principle of spirality. In order to raise a conscious generation, it is an important requirement for individuals to receive a qualified education from pre-school and to comply with the spiral principle for the academic, social and emotional development of students in this education process (MEB, 2018a; Şirin, 2020). Early life is the basis for a child's behavior in the later years of his life. Early interventions in this period will have a lasting effect on individuals' cognitive personalities and social behaviors (Bredekamp, 2015; UNICEF, 2003). Research findings support these data.

In the research, the teachers put forward their ideas that the subject of epidemic diseases in the science curriculum should be in the first unit of the first semester, by associating it with the current achievements or after the systems and living unit. Especially the teachers who stated that the first semester should be in the first unit are in the majority. The participants explained the reason for this as the opportunity to apply the knowledge learned about epidemics throughout the year. In this context, it has been revealed by the results of the study that if the subject of epidemic diseases is included in the science curriculum, it would be appropriate to have the first semester starting from the early grade levels.

When the views of science teachers on teaching methods on epidemic diseases are examined, it is seen that case studies, projects, expert invitations, experiments, scenario writing, discussion, drama, problem solving, observation, role playing, research analysis, simulation, demonstration methods come to the fore. When the opinions about the materials that can be used in the teaching of epidemic diseases are examined, the materials such as video, picture/photographs, printed material, real obje and slide are the emerging opinions for appropriate materials. It is of great importance to use appropriate teaching methods for an effective teaching

(Aydede et al., 2006). It is important to choose teaching methods and techniques that can provide applicability and permanence by students, especially depending on the content of the subject to be taught. Aydede et al. (2006), stated in their study that the nature of the subject should be taken into account in addition to the course materials in the selection of teaching methods and techniques by science teachers. According to Akerson (2005), teachers should choose activities that will make students active in their lectures. In the literature, there are studies stating that teachers frequently use methods such as role playing, drama, experiment, laboratory and demonstration in which students are active (Bardak & Karamustafaoğlu, 2016; Oh & Kim, 2013). On the other hand, there are also studies that teachers stated, these activities such as drama will cause problems in classroom management and cause loss of time (Timur & İmer, 2012; Tekbıyık & Akdeniz, 2008; Kırıkkaya, 2009). With this study, it was emphasized that it would be appropriate to use teaching methods and materials that would make the student active and provide permanent learning in teaching the subject of epidemic diseases. Teaching such an important subject, which affects the whole world deeply, with appropriate teaching methods and techniques is of great importance in terms of both the content of the subject and making what is learned into living.

Conclusion and Suggestions

In this research, the situation of the epidemic diseases and its inclusion in the science curriculum, which has become the agenda of the whole world with the Covid 19 pandemic and which is also a socio-scientific issue, evaluated according to the views of science teachers in terms of school's role, teacher's role, student's role, reasons, advantages and disadvantages, grade level, learning outcomes that can be included in the program, teaching methods-techniques and materials. As a result of the research, it was determined that the teachers thought that the issue of epidemic diseases should be included in the science programs in order to evaluate the issue from a socioscientific perspective. The inclusion of epidemic diseases in science programs is considered important in terms of access to reliable information, ensuring widespread effect, raising conscious individuals, social awareness, daily life relationship, and early education. Teachers think that this education can be given at pre-school, primary and secondary education levels. He has a similar opinion that the topic of epidemic diseases should be in the first semester of the program, but opinions differ on the topics that can be taught. Teachers suggest that the subject of epidemic diseases should be taught with methods and materials that will activate the student and provide permanent learning. Pandemic is a socio-scientific issue that concerns all humanity and needs to be addressed on a global scale. The pandemic needs to be handled in a multifaceted way, with its sociological, economic, political, health and educational dimensions. For this reason, it is suggested that the developers of the science curriculum programs should examine the results of this study, and the researchers should investigate the status of the epidemic diseases in international science curriculums with teachers from different country.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in JESEH journal belongs to the authors.

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