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Investigation of science teachers' views towards online education

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Abstract

This study aimed to examine science teachers' opinions about online education during the pandemic period. In the research, phenomenological research, one of the qualitative research designs, was adopted. In the 2020–2021 academic year, 33 science teachers working in central and rural areas of Erzurum were studied. An online interview form was used as a data collection tool. The content analysis method was used in the analysis of the data. As a result, it can be said that, in addition to the disadvantages of online education, it provides convenience to teachers and students in various fields and has an advantage compared to face-to-face education. To facilitate the adaptation of teachers and students to online education, informative training can be provided, parents can be informed about the process and students can be supported in solving their problems.

Keywords: Views, online education, teacher, pandemic, science teachers.

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1. Introduction

The coronavirus disease 2019 (COVID-19), caused by the new type of coronavirus that emerged in Wuhan, China, in December 2019, spread to many parts of the world in a short time. Following these developments, the World Health Organisation (WHO) (2021) declared it a global pandemic on March 11, 2020. Pandemic is expressed as a major epidemic or a disease being prevalent in a continent or several countries at the same time (Turkish Language Institution [TDK], 2020). Due to the current pandemic, daily life has been affected in every sense. General curfews and restrictions have been declared in many countries. In many occupational groups, working life has been interrupted, and millions of people are working from home. The pandemic has also deeply affected educational institutions. Due to the pandemic, as of 07 April 2020, face-to-face education has been suspended in schools in 188 countries due to the COVID-19 pandemic (United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2021). The main purpose of suspending face-to-face education is to reduce the spread of the disease, protect the public and children's health and alleviate the burden on the healthcare system (Giannini & Lewis, 2020).

Education continued as compulsory (emergency) online education in the first period and then as online education because the pandemic did not end (Angoletto, 2020). Although this transformation took place very quickly and suddenly during the pandemic period, distance education practices in higher education in Turkey are very old and many universities have distance education programmes in associate, undergraduate and graduate education (Higher Education Institution [YOK], 2021). Distance learning is a flexible and effective learning system in which educational materials are presented to learners electronically, performed independently of space and time and can incorporate different technologies into the learning process (Yamamoto & Altun, 2020). Bringing education online creates the opportunity to teach anytime and anywhere (Hodges, Moore, Lockee, Trust & Bond, 2020). However, economy, technology and equality are important for distance education systems to be effective (Kurubacak & Yuzer, 2004). Another factor affecting success in distance education is the learners' self-efficacy levels. Learners' self-efficacy can positively affect their success in distance education, although it does not guarantee it (Dabbah & Bannan-Ritland, 2005).

In online distance education environments, individuals with different characteristics can easily learn effectively with contemporary methods (Rovai & Downey, 2010). However, there are also disadvantages such as limited interaction between teacher, student and peers and lack of motivation (Uzoglu, 2017). Anderson (2020) stated that with the transition to distance education, problems such as lack of internet connection and lack of technological devices in the education system cause inequality.

It is stated that in distance education carried out during the COVID-19 pandemic, problems such as the rapid transition to platforms such as Zoom may negatively affect the teaching programmes, encountering difficulties in classroom management and difficulties for educators who are not familiar with computers and the Internet (Iwai, 2020). Can (2020) concluded in his research that the pandemic period has experienced a significant increase in the demand for open and distance education, it is also important qualities besides the quantity and infrastructure of the open and distance education system in Turkey, access, security, content, design, implementation, quality, legislation and it should be strengthened pedagogically. In another study conducted with science teachers, it has been determined that teachers had problems such as Internet connection, communicating with students, a low participation rate of students in classes, being exposed to pressure from the school administration and concerns about not being able to complete the distance education and teaching programme and laboratory/workshop activities etc.; however, the pandemic mostly affects the use of educational technologies and their professional development positively (Bakioglu & Cevik, 2020).

In this research, we tried to determine the opinions of science teachers about the applications, materials, methods/techniques and measurement/evaluation methods they prefer in online education, the problems they encounter, the positive and limited aspects of online education and its

development. The purpose of this research is to examine the views of science teachers about online education during the pandemic period. In line with this purpose, the problem of the research is determined as: 'What are the views of science teachers about online education during the pandemic period?'

2. Method

2.1. Research design

The phenomenological approach, one of the qualitative research designs, was used in the research. Phenomenological research focuses on the experiences of individuals and focuses on what these experiences mean for individuals (Creswell, 1998). The phenomenological design is the most appropriate method in order to deal with all aspects of science teachers' views on online education during the pandemic period in detail.

2.2. Participant group

In the 2020–2021 academic year, 33 science teachers working in Erzurum city centre and rural areas were studied. The maximum variation sampling method was used to determine the teachers. The maximum variation sampling is to examine the problem situation in a wider framework by revealing the aspects that combine or diverge between different situations in line with the determined purpose (Johnson & Christensen, 2014). Accordingly, teachers working in different types of schools, teaching at different grade levels and in various years of their profession were selected. 18 of the teachers were female and 15 were male. Professional experience of teachers ranges from 1 to 24 years. 16 teachers worked in the city centre and 17 teachers worked in villages and district centres.

2.3. Data collection tool

The online interview form was used as a data collection tool in the research. The interview form consists of two main parts where demographic characteristics and opinions are taken. In this form, there are questions about the way of education, the positive and limited aspects of online education for themselves and their students, the programmes used in online education, materials, measurement/evaluation methods, their effects on students' learning and the problems encountered. The prepared questions were presented to the opinion of two field experts who took part in distance education and had research on this subject. Experts expressed their opinion that the questions can be used as they are. A pilot study was conducted with three selected science teachers. As a result of the pilot application, it was determined that the questions in the opinion form were understandable and the form served its purpose. The interview form was presented to the teachers online and the answers were received online. Before the analysis of the data obtained from the interview form, it was examined how many minutes the preservice teachers answered each question in the form and it was determined that the time allocated to answering was sufficient.

2.4. Analysis of data

The data were analysed by the content analysis method. The content analysis enables researchers to discover, meaningfully reveal and examine in-depth the contents of data obtained from any source such as audio recordings, video recordings or pictures, usually written documents in communication (Fraenkel, Wallen & Hyun, 2011; Neuman, 2014). In the analysis of the data, the steps shown in Figure 1 were followed.

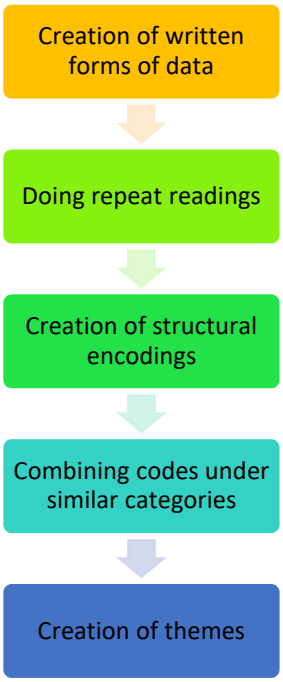

Figure 1. Processes followed in content analysis

The data obtained were analysed by another researcher in the field independently of the original researcher and calculated with the percentage of agreement formula between the two analyses as follows:

$$\text{Percent of agreement} = \frac{\text{Amount of agreement}}{\text{Amount of agreement} + \text{Amount of disagreement}} \times 100$$

The percentage of agreement between the two analyses was calculated as 73%. It can be said that reliability is achieved if the compliance percentages are 70% or more (Miles & Huberman, 1994).

3. Results

The results of the content analysis conducted to determine the teachers' views on the way in which education was conducted are given in Table 1.

Table 1. Teachers' views on the form of education

Theme	Code	*f*
Mode of education	Face-to-face	28
	Face-to-face and online together	5
	Total	33

As can be seen from the results of the analysis given in Table 1, most of the teachers think that face-to-face education should be carried out, but a small number of them think that face-to-face and online education should continue together. It is seen that no teacher has expressed an opinion on the use of online education, which is compulsory under the conditions of the pandemic, alone.

The results of the content analysis to determine the applications, materials, methods/techniques, and measurement/evaluation tools that teachers prefer to use in online education are given in Table 2.

Table 2. Applications, materials, methods/techniques and assessment/ evaluation tools preferred by teachers in online education

Theme	Code	*f*[a]
Applications used	EBA	22
	Zoom	21
	WhatsApp	11
	Skype	11
	Kahoot	5
	Google Classroom	5
	Morpa campus	3
	Google Form	3
	Microsoft Teams	3
	YouTube	2
	Virtual tablet	1
	Total	87
Materials used	Presentation	13
	Video	9
	Textbook	6
	EBA activities	5
	PDF lecture notes	4
	Smart notebook	4
	e-Journal	1
	Not using materials	3
	Total	45
Method/techniques used	Lecture	17
	Question–answer	17
	Brainstorming	10
	Demonstration	4
	Total	48
Tools used in measurement and evaluation	Online test	12
	Activity tracking	9
	Assignment via EBA	8
	test	8
	Design and storytelling	1
	Total	38

[a]Teachers expressed more than one opinion.

According to the analysis results given in Table 2, it was determined that teachers mostly use EBA, Zoom, WhatsApp and Skype applications. It is seen that teachers mostly use PowerPoint presentations and videos as materials, but a small number of them prefer not to use materials. It was determined that the teachers used the most lecture and question–answer techniques in their lessons. Teachers mostly benefit from activities such as online tests, activity tracking, EBA assignments and test solving in assessment and evaluation processes.

The results of the content analysis conducted to determine the teachers' views on the advantages of online education are given in Table 3.

Table 3. Teachers' opinions on the advantages of online education

Theme	Code	*f*[a]
Facilities offered by online training	Accessibility	29
	Comfort	12
	Safe	7
	Fast	7
	Digital possibilities	7
	Technology use	5
	Suitable for the student	3
	Free to be	2
	Total	72
Contribution to learning	Visualisation	6
	Concretisation	4
	Homeschooling opportunity	3
	Individualised learning	2
	Total	15
Contribution to affective development	To draw the interest of students	4
	Motivate	2
	Increase self-confidence	2
	Total	8

[a]Teachers expressed more than one opinion.

According to the results of the analysis given in Table 3, the teachers think that the ease of access to the content, providing comfort, visualisation, concretisation of the content and attracting student attention are the advantageous aspects of online education.

The results of the content analysis conducted to determine the teachers' views on the disadvantages of online education are given in Table 4.

Table 4. Teachers' opinions on the disadvantages of online education

Theme	Code	*f*[a]
Negligence of education	Neglect of education	2
Inequality of opportunity	Inequality of opportunity	8
Students who are not technological literacy	Illiteracy of technology	13
Negative influence on social skills	Lack of communication	17
	Lack of cooperation	8
	Lack of socialisation	2
	Total	27
Lack of student participation	Lack of participation	10
	Not getting feedback	3
	Think of holiday	2
	Total	15
Negative affect on affective development	Lack of motivation	10
	Lack of attention	9
	Lack of interaction	4
	Total	23
Technology and connectivity issues	Connection issues	22
	Technological incompetence	21
	Infrastructure issues	10
	Total	53
Difficulties experienced in learning	Lack of active learning	16
	Persistent lack of learning	3
	Lack of information sharing	2
	Difficult to follow up with students	1
	Not suitable for student level	1
	Lack of study habits	1
	Total	24
Problems caused by parents and home environment	Lack of parent support	8
	Home problems	3
	Total	21

[a]Teachers expressed more than one opinion.

According to the results of the analysis given in Table 4, the teachers stated that online education has disadvantages such as neglect of the education dimension, lack of communication, students' non-participation, lack of motivation, distraction, connection problems and technological inadequacies, inability to implement active learning, inequality of opportunity, illiteracy of technology of students and lack of parent support.

The results of the content analysis conducted to determine the teachers' views on the development of online education are given in Table 5.

Table 5. Teachers' views on the development of online education

Theme	Code	*f*[a]
Ensuring equal opportunity	Opportunity equality	12
Obligation to participate	Obligation to participate	11
Development of technological infrastructure	Development of infrastructure	8
Development of interactive content	Development of content	6
Ensuring motivation	Motivation	2

[a]Teachers expressed more than one opinion.

As can be seen from the results of the analysis given in Table 5, the teachers expressed their views on providing equality of opportunity among students, obligation to participate in online courses, and developing the technological infrastructure for the development of online education. Examples of the answers given by the teachers are given below:

> *ST-6: First of all, students lack Internet and technological equipment. Unfortunately, most of the children do not have an internet connection. Some of them do not have internet access where they live. Some of them have internet on their parents' phones, but they cannot access the EBA course application from their phone. Cannot be resolved. …*
>
> *ST-14: … Negative. Because there is no attendance to regular classes. One of my children works in the market and cannot attend classes during the day. When he comes back from work in the evenings, he attends lectures. Some patients have problems at home. Parents do not support it.*
>
> *ST-20: EBA in the first place. Definitely a great platform. Subject videos, questions, interactive games and experiments, tests... You can analyse them and follow the students' homework. In addition, applications from KAHOOT online exam and prepare lecture videos on YouTube, I perform live quizzes. I chose them because students know these platforms better. …*

4. Conclusion, discussion and recommendations

In the research conducted to examine the views of science teachers about online education during the pandemic period, a phenomenological design was used and the data were collected by online interview form and analysed by content analysis.

As a result of the research, it was determined that the teachers mostly preferred face-to-face education, but a small number preferred a hybrid model in which face-to-face and online education were used together. However, due to the protection of health during the pandemic period, only distance education applications are compulsory. Can (2020) similarly concluded that 68% of teachers continue with distance education.

It was determined that teachers mostly use EBA, Zoom, WhatsApp, and Skype applications. It is seen that teachers mostly use PowerPoint presentations and videos as materials, but a small number of them prefer not to use materials. It was determined that the teachers used the most expression and question–answer techniques in their lessons. Teachers mostly benefit from activities such as online tests, activity tracking, EBA assignments and test solving in assessment and evaluation processes. It can be said that the level of benefiting from technological applications and transferring active learning methods to a digital environment is low because online education is a new and unfamiliar situation for teachers, they cannot make adequate planning and they experience Internet and technology problems. The results obtained from this research are similar to the methods and materials used by teachers in many countries (Basilaia & Kvavadze, 2020; Mulenga & Marban, 2020).

Similarly, Can (2020) concluded that science teachers use question–answer and narrative techniques as method/technical methods and presentations and videos as materials in distance education.

Teachers think that online education has advantages, such as ease of access to the content, providing comfort, visualisation and concretisation of the content and attracting students' attention, and disadvantages, such as the neglect of the educational dimension in online education, lack of communication, students' non-participation, lack of motivation, distraction, connection problems and technological inadequacies, active He thinks that there are disadvantages such as inability to implement learning, inequality of opportunity, illiteracy of technology and lack of parent support. It can be said that the subjects are embodied in online education, thanks to various animations, videos, and interactive content, and the motivation of the students increases, thanks to the access to more visual and interesting content. It can be said that there are problems such as inequality of opportunity, lack of participation, communication problems, distraction and inability to provide active learning since students and teachers cannot come together in the same environment, have insufficient camera and microphone access, students do not have Internet access and do not have technological devices to follow the lessons. Similarly, Can (2020) stated that there are problems such as Internet connection, lack of infrastructure, lack of technological devices of students, lack of communication, low participation and lack of motivation.

It was determined that the teachers expressed their views on the development of online education, ensuring equality of opportunity and opportunity among students, compulsory participation in online courses and improving the technological infrastructure. Sintema (2020) also concluded in his research that similar problems were experienced.

This research is limited to 33 science teachers working in Erzurum province. For this reason, similar studies can be conducted with a larger participant group and science teachers working in different regions. Similar applications can be made with teachers working in different branches. Different studies can be conducted in which the students of the teachers participating in the study are included. Researches can be conducted to compare the online education made at the beginning of the pandemic and the online education applications made for the future.

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