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Determining Student Opinions on Science Teaching Based on New Generation Questions in Online Teaching Environments

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Abstract

New generation questions are the complex questions that require students to understand what they read, make inferences, solve problems, analyze, think critically, and use scientific process skills. The features of questions asked in the international exams that intend to compare the educational achievement levels of countries are equivalent to new generation questions. However, in the literature, still there exist a limited number of studies on new generation questions. It is thought that analyzing the students' opinions on this type of questions may contribute to future studies. In this respect, this study intends to determine students' opinions on the science teaching approach based on new generation questions in online teaching environments. This research is conducted with survey design from the qualitative research methods. Within the scope of the study, in order to introduce new generation questions, 18 students from the 7th grade at a secondary school attended online interactive lessons related to the unit "Interaction of Light with Matter". In the follow-up process, students solved new generation questions about the relevant unit. The questions were carefully selected from the questions prepared by the Turkish Republic Ministry of National Education (MEB). During the implementation, in accordance with purposeful sampling, 4 students from each of the 2 groups that had high test scores and low test scores were selected to carry out semi-structured interviews. The transcribed interview minutes were analyzed, coded and categorized. The qualitative findings obtained from the research suggest that students are not familiar with new generation questions, questions are long, difficult to understand and challenging students to think.

Keywords: Science teaching, new generation questions, online learning environment

Introduction

Education plays one of the most crucial roles in the growth and development process of countries. In the competition of countries for development, science has an important place. Therefore, countries strive to provide their people with the most effective science education to improve science-literacy (Küçükyılmaz, 2016). Countries can reach the desired level of development only by keeping in step with the modern developments (Karamustafaoğlu, 2018). Updating the science education significantly contributes to the development of countries. In this respect, countries need international exams in order to compare and evaluate the quality of their education programs (MEB, 2019). PISA and TIMSS are among the important exams that are held for this purpose. Results obtained from the international exams make it possible for the countries to see the points in their education programs that need improvements so that they can make necessary changes (Gürbüz, 2019). Türkiye takes part in these exams and evaluate the results obtained. Türkiye has embraced the constructive approach in Science Curriculum since 2005. In this regard, Türkiye revised its science curriculum in 2013 and adapted inquiry-based approach in science lessons (MEB, 2018). The main goal of this new approach is to improve science-literacy in students. According to MEB, science-literate individuals are those who can solve problems, think analytically, and have scientific process skills (MEB, 2013).

Türkiye did not achieve the desired success until the PISA 2018 and TIMSS 2019 exams. Its scores in these years were higher compared to the results obtained in the previous years. The new understanding adapted in assessment and evaluation is the major factor that improved the scores of Türkiye in these exams. With this new approach, MEB redesigned the questions asked in the exams that it held within the scope of High School Placement System (LGS) (MEB, 2019). Türkiye has made significant changes in LGS since 2018 in terms of the nature of questions. It is

stated that the LGS questions are different from the ones that were asked in national exams in the previous years and they're designed to evaluate the higher-order thinking skills. These questions are designed to evaluate to what extent students understand what they read, make inferences, solve problems, analyze, think critically and use scientific process skills (MEB, 2021). These questions, which are very similar to the ones asked in international exams, are often called in the education system as new generation questions, skill-based questions or context-based questions (Erden, 2020; Kertil et al., 2021) Literature analysis shows that there are a limited number of studies on the new generation questions that recentl entered the Turkish education system. The relevant literature is limited with the studies on the criteria for preparing new generation questions (Elmas and Eryılmaz, 2015; Kabuklu et al., 2019), comparison of new generation questions and traditional questions (Sak, 2018; Tekbıyık and Akdeniz, 2010; Ünal, 2019), students' process of solving new generation questions (Nasırlıel, 2020), opinions of teachers and students on new generation questions (Ar, 2019; Erden, 2020; Kablan and Bozkuş, 2021; Kertil et al., 2021). It is also seen that there are international studies reviewing the nature and quality of the questions asked in international exams, in other words the necessary criteria that new generation questions must have (Ahmed and Pollitt, 2007; Chi et al., 2022; Hamberger, 2014; Roehl, 2015).

In addition to the limited number of studies on new generation questions in the literature, the focus of education systems has changed due to the pandemic we faced in the recent years. Educational activities moved to online learning environments as the focal-point changed in the education systems. Distance education models are suggested as a remedy to the lack and inefficiency of physical structures, tools, equipment and qualified teachers, as well as inequality in education (Kaya, 2002). Distance education is where the learner and the educator interact with each other with the help of various tools and equipment although they are physically in different places (İşman, 2022).

Today, the term distance education which moved from offline environments to online environments with the help of the advancements in technology are callied as "online learning" in recent studies (Telli and Altun, 2021). Online learning is considered the fifth generation of distance education. Online learning is the distance education model where the student and educator are not physically present in the same place at the same time period but they meet via Internet (Bektaş and Çakır, 2021). The lessons in online learning may be synchronous or asynchronous. In the synchronous method, the lessons are held when the student and educator are in different places at the same time period. Whereas in the asynchronous method, the student and educator are physically in different places and at different time periods (Yıldırım, 2020). Online learning environments, which are a part of the education, entered our lives very fast with the outbreak of the pandemic. With the outbreak of the Covid-19 pandemic in China in 2019, the disease took hold and countries across the world entered lockdowns causing closures and halting the daily life. People were ordered to remain indoors in order to prevent the spread of the disease. During the pandemic, Türkiye enforced lockdowns as well as school closures. To minimize the educational losses caused by the closures, learning and teaching activities moved to online platforms. Türkiye carried out online educational activities on EBA system. The educational activities continued with complementary activities at homes. The pandemic moved the education and teaching to online learning environments that consequently became highly important.

Teaching activities that were carried out on online learning environments became diversified. Nonetheless, transferring the new generation questions into online learning environments was inevitable. Taking and solving test questions is necessary in order to reinforce learning and improve retainment of the subject. Therefore, this study, which intends to determine the student opinions on science teaching based on new generation questions in online learning environments, is deemed valuable.

International Exams and New Generation Questions

International exams are unique tools for countries in order to see to which extent they have reached international educational standards, whether their educational systems are compatible with the others', and where they rank in the race of education (Çepni, 2019). International exams organized by international development and aid organizations are important in terms of meeting this demand (Yolsal, 2017). Among the most well-known exams are PISA and TIMSS. PISA is a survey study which is administered in every three years by the Organisation for Economic Cooperation and Development (OECD). It aims to measure the students' performance in reading, mathematics and science (MEB, 2019). The objective of PISA is to measure to which extent the students who took the basic education have acquired skills and competencies that are necessary in order to adapt to the daily life (Çepni, 2019). The question types used in PISA exams are multiple-choice questions, short-answer questions or open-ended long-answer questions. The questions are related to the problems and situations that students may face in the daily life (Çepni, 2019; MEB, 2019). TIMSS is an achievement monitoring survey administered in every 4 years at the fourth and eighth grades by the International Association for the Evaluation of Educational Achievement (IEA). TIMSS is an exam focusing on measuring students' educational achievements in science and mathematics. Additionally, it administers surveys to students, teachers, parents and also administrators to reveal the factors that affect students' achievements (MEB, 2020). It evaluates the learning dimension and thinking processes on the basis of the subjects that are included in the curriculum for fourth and eighth grades. Conducted in every four years, TIMSS offers a longitudinal option. TIMSS is conducted with different types of questions such as multiple-choice questions, long and short answer open-ended questions and performance tasks (Çepni, 2019).

It is seen that the questions that students answer in international exams are related to the problems and situations in the daily life (MEB, 2019, 2020). Türkiye has made many changes and improvements in its education system in accordance with the results obtained in the international exams (MEB, 2019). The changes that were made in high school national placement exam in 2018 are one of these changes. With the High School Placement Exam in 2018 (LGS), the questions started to be related to problems and situations in the daily life, requiring to use reading skills and think scientifically. In the literature, such questions are called as context-based, life-based, skill-based and new generation questions (Ar, 2019; Elmas and Eryılmaz, 2015; Erden, 2020; Kertil et al., 2021; Nasırlıel, 2020; Şan and İlhan, 2022; Ünal, 2019). New generation questions are the preferred term in this study although above-mentioned terms are present in the literature as well.

It is stated that LGS questions are designed to measure a variety of skills such as reading, interpreting, making inferences, problem solving, analyzing, critical thinking and scientific process skills (MEB, 2021). MEB released example questions on online enviroments to introduce

the new generation questions. Literature analysis shows that new generation questions should be prepared on the basis of certain criteria. Example situations that are given in the questions should be related to the real situations that individuals and communities are living in. Questions should be related to the concepts, formulas and laws of science. Questions should be authentic and original, not memorized, additionally they should require students to find the answers as a result of a process. The questions that are designed on the basis of these features are described as new generation questions.

There are studies on the features of new generation questions (Sak, 2018; Tekbıyık and Akdeniz, 2010; Ünal, 2019), the criteria that questions must have (Elmas and Eryılmaz, 2015), student and teacher opinions on new generation questions (Ar, 2019; Erden, 2020; Kablan and Bozkuş, 2021) Kertil et al., 2021), students' new generation question solving processes (Nasırlıel, 2020). This study has been conducted to determine the student opinions on science teaching based on new generation questions in online teaching environments.

Method

This study is conducted with survey design from qualitative research methods. It is possible to make generalizations about the research results by collecting data with this method (Fraenkel, Wallen, Hyun, 2012). In today's rapidly changing world, individuals are facing problems to adapt to the changes and solve emerging problems and challenges. With qualitative research methods, newly emerging problems are scrutinized in-depth and opinions of people are analyzed (Seggie and Bayyurt, 2021). The purpose of qualitative research is to support the data by elaborating the information that is based on experiments, and make new suggestions (Knobe and Nichols, 2013). For this reason, survey design from qualitative research methods has been used to determine the student opinions on science teaching based on new generation questions in online teaching environments.

Research Sample

The samples in this study were selected with maximum variation sampling method. The research sample was selected from the students at 7th grade at a state school which is located in Osmangazi district of Bursa, Türkiye during 2020-2021 school year. The classroom of the samples was randomly selected from five 7th grade classrooms. There are 30 students in this classroom. Educational activities moved to online environments in 2020 due to the coronavirus pandemic. Therefore, Türkiye has continued its educational activities via EBA online learning platform where students and teachers met online. This study is conducted with 18 students who joined the online learning environments with perfect attendance. Students took academic achievement tests at the end of learning subjects. Students were selected with maximum variation sampling method. 4 students with high academic achievement level and 4 students with low academic achievement level were selected out of 18 students and interviewed with semi-structured method.

Data Collection Tools

Semi-structured interview questions were prepared to elicit opinions from the students. The students answered these semi-structured interview questions. The interviews were audiotaped. Then, the audio recordings of the interviews were transcribed.

Semi-Structured Interview Questions About the New Generation Questions:

These are the semi-structured interview questions prepared by the researcher to elicit opinions of students on new generation questions that are solved during the lessons. The researcher prepared a pre-interview form consisting of 8 questions appropriate for the semi-structured interview. To obtain face validity, the interview questions were assessed by a university academic member. In the light of suggestions and interpretations, the researcher prepared the 7-question semi-structured interview form. Below are the questions in this interview form.

Semi-structured interview questions for students about the new generation questions

1-What do you think about the new generation questions that were solved in the Light Unit?

2-Are the science questions solved in the Light unit different from the science questions that were solved before? If yes, please describe.

3-What have you learned from the science questions solved in the Light unit?

4-Do you think the questions solved in the Light unit are easy and clear? Did you have any difficulty with the questions?

5-Are the questions asked in the Light unit similar to the problems that you may come across or you have already faced in the daily life?

6-After these questions, when you come across with a problem how will you solve it?

7-Can you apply scientific process skills such as hypothesizing, finding dependent and independent variables, interpreting a chart, creating a chart from certain data? Do you feel confident to do this?

After one of the students was interviewed, the relevant interview questions and pilot interview recording were sent to a university academic member for expert review. The interview questions were revised in the light of the expert review and then the other students were asked semi-structured interview questions.

Data Collection Process

Firstly, necessary data collecting permissions were obtained from the Bursa Provincial Directorate of Education. After the study was planned, the students had classes to study the unit "Interaction of Light with Matter". These live classes were held online on EBA platform due to the pandemic. The teachers uploaded the class timatable to the application. The students and teachers met on the online learning platform at the planned time. During the online classes, the teacher solved example questions in order to reinforce learning. The example questions that were solved were selected from the new generation questions released by the Ministry of Education. During the live online lessons, students were expected to solve the questions that they saw via screen sharing. Then, the questions were discussed and solved. 4 students with high academic achievement level and 4 with low academic achievement level were selected on the basis of their scores from the academic achievement test that they took after the subjects were finished. The 8 students who were selected attended a semi-structured interview. The research data were obtained from these interviews.

Analysis of the Data

The interviews with the students were designed to reveal the students' opinions. Voice recordings of the interviews were listened in order to transcribe the answers of the students. The data obtained from the interviews with the students were analyzed with context analysis method. In the analysis process, similar student opinions were grouped in order to create codes and categories. Having created codes and categories, it became easier to interpret the qualitative data. Content analysis aims to give organized and objective information about the text (Krippendorff, 1980).

Research Ethics Approval

This research complies with all the rules stated in the "Higher Education Institutions Scientific Research and Publication Ethics Directive". None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, were taken.

Ethics Committee Approval Details:

Ethics review board: Bursa Uludag University Social and Human Sciences Research and Publication Ethics Committee

Ethics committee approval date: 27.11.2020

Permission of ethics document's number: 2020-09

Findings

Students' answers to the semi-structured interview questions are given in the table which is created according to the content analysis.

Table 1: *Students' opinions on new generation questions presented in categories and codes*

Category	Code	Example
Student opinions on new generation questions	Difficulty	** I think it is difficult. I spend too much time to read. Reading comprehension is important. ** I think it is difficult. We should solve this type of questions during the course of preparation for LGS. It improves our achievement level. * Questions are long and time-consuming. It was difficult. * Questions are difficult.
	Complexity	** We can answer these questions only by interconnecting our already existing prior knowledge and with multiple other knowledge. They are complex questions consisting of multiple steps.
	Medium difficulty	** They care built on reading and understanding. You can easily solve the questions if you read and understand. I think it is both good and bad. The good thing is that if you can understand the keywords in the paragraph given you can easily solve them. New generation questions demand less processing. *They measure reading comprehension, in this regard they may be difficult yet I think it is rewarding. * Some were difficult, some were easy. Some of them can be easy if you understand it.

Table 1: *Students' opinions on new generation questions presented in categories and codes (continuation-1)*

Differences between the new generation questions and the ones you studied before	Long and time-consuming	** Questions are time-consuming because they are long. Another point in these questions is that the process is our own decision. ** I can solve new generation questions. The classic questions we used to solve were not descriptive. Time consuming but it becomes easier to solve the questions as you read and understand them. * To me, new generations are difficult. It is difficult to read and understand them because they are long. * There are differences. They are more difficult compared to the ones we used to solve. There are some situations that we never see before. They were long questions.
	Based on interpretation.	* Classic questions are easier and more straightforward. To me, new generation questions are more complex. They require interpretation as well as reading comprehension. We have to interconnect multiple knowledge in order to visualize it in our mind. * In the past, questions used to be about the things that we are familiar with. Difficult questions. ** They are more complex questions compared to the classic ones.
Benefits of new generation questions	Facilitates learning	** Acquired. They provided more feedback in terms of knowledge. ** They taught me new things. They improved my visual reading. Visual aids help me solve the questions more easily. * Learned new things. I learned new words.
	Problem solving skill	** In my daily life, I can solve the problems in steps. When I understand the questions, I can solve the problems in steps that I come across in the daily life. Sometimes, new generation questions may not present situations from the daily life.
	Reading comprehension skill.	** Acquired. It helped me understand what I read. * It improved my reading comprehension since it measures reading.
	Logical thinking skill	** It helped me think logically.
	Reinforcement of subject	* It rather helped me understanding the subjects
The parts that you have problems with in the new generation questions	Based on reading, and long	** It was too difficult to read since I don't have a reading habit. Therefore, it was difficult for me. * They were long. ** Some of them were long. Despite being longer, they may be easier than the short questions. To me, some of them are more complex and difficult. I felt daunted when I first read them.
	It is difficult to understand.	* They are more difficult because they are usually more complex. ** Sometimes. I can understand the questions since I have a reading habit. Some questions are unclear, they are difficult for me. * Difficult to understand. Sometimes, there are words that I don't know their meanings.
	Challenging	** There were difficult points. It demands thinking.

Table 1: *Students' opinions on new generation questions presented in categories and codes (continuation-2)*

Are the new generation questions related to the daily life?	Yes	** Yes. We should look the roots of the situtaion. * Yes. ** There are questions about mirrors and lenses. These are from the daily life. * Yes, there were questions from the daily life.
	No	** The things that I come across in the daily life are easier. The situations in the new generation questions are usually only in the exams.
	Undecided	* No. Yes, if there is an example given. ** Yes, some of them are from the daily life but there are some questions that I have or will never experience. * More or less, they are.
How do you solve problems?	Determining the problem	** It helped me solve problems. I decide which method I should follow upon understanding the question. I decided which processes I should do, then I draw shapes if I should. I cross out the incorrect options. ** First, I identify the problems. Then, I narrow down the problems. ** We should look at the roots of the situation. * I associate the questions with the problems. * I try to solve it by interconnecting multiple knowledge.
	Planning	** I use my already existing knowledge. I make plans. I use my existing knowledge.
	I am undecided	* Nothing else comes to my mind now.
Do you have scientific process skills? Do you feel confident?	Self-confidence	** Yes, I feel confident. I can transfer them to my daily life as well. * After these questions, I think I can solve them.
	Willingness to retry	** I can make the scientific processes such as hypothesizing, determining the variables, designing an experiment, creating a table. But I should look back on the things that I forgot. * I think perhaps I can make an experiment. I think I can make. ** At the moment, I don't remember all of them but I can do it if I look over my notes. I feel confident. * I can do it if I revise.
	Lack of confidence	** I don't think so. I have a difficulty in recalling. * I am not confident. I don't recall it at all.

**Answers of students with high academic achievement level
*Answers of students with low academic achievement level

During the interviews, the students remarked that new generation questions are difficult and complex. They also stated that they have problems in reading the questions. However, they stated that new generation questions push them to think. They noted that new generation questions are based on reading skills. They expressed that compared to the classical ones new generation questions are longer, time-consuming, based on reading and require interconnecting the situations. They stated that new generation questions improved their skills such as problem solving, reading comprehension, making experiments. The students expressed that the questions introduce them new things, and as students being required to read this new information forces them to learn new things, which reinforces learning. Being based on reading comprehension and demanding them to think makes the new generation questions challenging. Students answered problems based on situations similar to the ones that they experience in the daily life. This enabled them to transfer the knowledge from school to the daily life. Additionally, having found something

from their daily life in the questions that are designed very similar to the real-life situations they were further motivated. Students expressed that solving new generation questions improved their self-confidence. They stated that new generation questions increased their motivation, improved academic achievement level and scientific process skills.

Conclusion and Discussion

During the interviews, majority of the students stated that the new generation questions are difficult. They expressed that the fact that the questions are long, based on reading, require to interconnect situations and make interpretations is challenging for them. The lack of reading habit and having solved insufficient number of questions that are based on reading and interpretation are thought to be the reasons behind such answers of the students.

Students stated that in the new generation questions sometimes they encountered with new problems that they haven't come across in their daily life. This suggests that those who prepare the questions do not design appropriate questions for the students. New generation questions have just entered our education system. Therefore, it seems that it is difficult to create and find quality new generation questions (Erden, 2020).

It is stated that new generation questions help to teach students new things and concepts, think logically, make interpretations, and reinforce learning the subjects. This highlights the importance of using new generation questions in teaching and evaluating the subjects. Furthermore, new generation questions are thought to improve the self-confidence in students to use the scientific process skills. Some of the students expressed that at the end of this training they were self-confident in terms of scientific process skills.

Table 1 shows that students stated that new generation questions should be designed in connection with the students' lives. However, during the interviews they expressed that it is difficult to understand the questions and they couldn't understand what is being asked in the question. The studies in the literature which emphasize that context should be suitable for students and scenarios should be structured support students' statements (Elmas and Eryılmaz, 2015; Kabuklu et al., 2019).

In Table 1, students stated that they are not familiar with the new generation questions. It is seen that our students are not familiar with the new generation questions that have recently entered our education system. The studies in the literature suggest that the reasons for this are the new generation questions are not given enough in the textbooks, students are unfamiliar with the new generation questions and inconsistency between the curriculum and the textbooks (Erden, 2020; Tekbıyık and Akdeniz, 2010; Ünal, 2019).

In Table 1, students stated that new generation questions improved their scientific process skills and self-confidence. According to the students, new generation questions are difficult, based on reading, and auxiliary questions intended to increase the academical achievement level as they require using high-level thinking skills. Therefore, it can be said that new generation questions improve students' scientific process skills. However, studies in the literature suggest that assessment and evaluation system that support scientific process skills corroborate this. The questions asked in international exams in the assessment and evaluation dimension are intended

for measuring the scientific process skills such as problem solving, using relationships, saving and interpreting the data, and analyzing (Çepni, 2019; MEB, 2019; 2020).

Recommendations

1. Students are recommended to solve new generation questions since coming across with new generation questions during science classes which are designed with constructive approach improve students' academical and scientific process skills.

2. It is recommended that textbooks be updated and include more new generation questions.

3. It is also recommended that the questions in test books and supplementary textbooks be prepared in new generation question style.

4. It is recommended that education faculties of the universities organize trainings on preparing new generation questions.

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Conflict Statement

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Genişletilmiş Türkçe Özet

Çevrimiçi Öğrenme Ortamlarında Yeni Nesil Sorulara Dayalı Fen Öğretimine Yönelik Öğrenci Görüşlerinin Belirlenmesi

Giriş

Ülkeler, eğitim sistemlerini değerlendirmek için uluslararası sınavlara ihtiyaç duyar. Uluslararası sınav sonuçlarına göre ülkeler eğitim sistemlerinde yenilikler yapmaktadır. Ayrıca uluslararası sınavlar, diğer ülkelerle eğitim sistemlerini karşılaştırmak ve ülkelerin durumunu görebilmek açısından önemlidir (Karamustafaoğlu, 2018; Küçükyılmaz, 2016; MEB, 2019). Uluslararası sınavlar arasında PISA ve TIMMS önemli bir yer tutmaktadır.

PISA; Ekonomik İşbirliği ve Kalkınma Teşkilatı (OECD) tarafından üç yılda bir yapılan öğrencilerin fen okuryazarlığı, matematik okuryazarlığı ve okuma becerileri performanslarını ölçmeye yönelik dünyanın en kapsamlı araştırmalarındandır (MEB, 2019). Bu araştırmada öğrencilere yaşamlarında karşılaşabilecekleri sorunları çözebilme becerilerini ölçmeye yönelik sorular yöneltilmektedir (Çepni, 2019).

TIMMS; Uluslararası Eğitim Başarılarını Değerlendirme Kuruluşunun (IEA) matematik ve fen eğitimlerini taramaya yönelik dört yılda bir gerçekleştirdiği araştırmadır. Bu araştırmada öğrencilerin günlük hayatta karşılarına çıkabilecekleri durumları içeren, akademik başarılarını ölçen sorular yöneltilmektedir (MEB, 2020).

Ülkemiz PISA araştırmasına 2003 yılından itibaren katılmaktadır. 2018 PISA uygulamasına kadar ülkemiz isteninlen başarıyı yakalayamamıştır. 2018 PISA ile fen okuryazarlığı alanında 79 ülke içerisinde 39. olmuş ve önceki yıllara göre iyileşme olduğunu göstemiştir (MEB, 2019). TIMMS 2019 uygulamasında ülkemiz bir önceki uygulamaya göre ilerleme kaydetmiştir. Ülkemiz ilk defa fen bilimleri alanında ölçek orta noktasından anlamlı ölçüde yüksek başarı gösteren ülkeler arasında girmiştir (MEB, 2020). Eğitim alanında yapılan

iyileştirmelerin uluslararası sınavlarda yükseliş sağladığı belirtilmiştir. Yapılan yenilikler arasında ölçme ve değerlendirme anlayışının değişimi de gösterilmektedir.

Uluslararası sınavdan alınan sonuçlara göre ülkeler eğitim programlarını değerlendirmekte ve gelecekte ihtiyaç duyulacak becerilere sahip bireyler yetiştirmeyi gerçekleştirecek planlamalar yapmaktadır. Uluslararası sınavlardaki sorular ile ülkemizde yapılan ulusal sınav soruları farklı düzeyde sorulardı. Uluslararası sınavlardaki sorular öğrencilerin üst düzey becerilerini ölçmeye yönelik, günlük hayatla ilişkili problem durumları içeren sorulardan oluşmaktadır (Çepni, 2019; MEB, 2019). Ülkemiz uluslararası platformdaki soruları yakalamak ve başarılı olabilmek için eğitim alanında devamlı yenilikler yapmaktadır (MEB, 2020) Ülkemizde 2018 LGS ile birlikte uluslararası sınavlarda sorulan soru tiplerine benzer sorular ölçme ve değerlendirme alanında kullanılmaya başlanmıştır. Milli Eğitim Bakanlığı öğrencilerin sınavlarda karşılarına çıkabilecek sorulara benzer nitelikte soruları çevrimiçi ortamda yayınlamıştır. Böylece eğitim paydaşlarının sorulara alışmasını amaçlamıştır. Bu sorular ülkemizde beceri temelli, yeni nesil, bağlama dayalı sorular olarak adlandırılmaktadır (Ar, 2019; Elmas ve Eryılmaz, 2015; Erden, 2020; Kablan ve Bozkuş, 2021; Kabuklu ve diğerleri, 2019; Kertil ve diğerleri, 2021; Nasırlıel, 2020; Tekbıyık ve Akdeniz, 2010; Ünal, 2019). Yeni nesil sorular öğrencilerin üst düzey becerileri ve bilimsel süreç becerilerini ölçmeye yönelik sorular olmasının yanında problem çözme, çıkarımda bulunma, okuduğunu anlama, yorumlama, analiz yapma, eleştirel düşünme gibi becerileri ölçmeye yönelik sorulardır (MEB, 2021). Yeni nesil sorular bireylerin, toplumların içerisinde bulunduğu problem durumlarını ortaya koyan, ezbere yönelik olmayıp özgün olan, kavram, formül ve kanunlarla ilişkili sorular olarak nitelendirilmiştir (Elmas ve Eryılmaz, 2015).

Eğitim sistemimize giren yeni nesil sorularla ilgili araştırmalara bakıldığında, araştırmaların sınırlı olduğu görülmektedir. İlgili literatürün ağırlıklı olarak yeni nesil soruların hazırlanması (Elmas and Eryılmaz, 2015; Kabuklu et al., 2019), yeni nesil soruların geleneksel sorularla karşılaştırılması (Sak, 2018; Tekbıyık and Akdeniz, 2010; Ünal, 2019), öğrencilerin yeni nesil soruları çözme süreçleri (Nasırlıel, 2020), yeni nesil sorulara karşı öğretmen ve öğrencilerin görüşlerinin ela alındığı çalışmalardan (Ar, 2019; Erden, 2020; Kablan and Bozkuş, 2021; Kertil et al., 2021) oluştuğu görülmektedir.

PISA araştırmaları 2006 yılında bilgisayara dayalı değerlendirme yapmaya başlamıştır. Bu yıldan itibaren kâğıt-kalem yerine çevrimiçi uygulamalarda bilgisayara dayalı olarak öğrencilerin becerileri ölçülmüş ve değerlendirilmiştir (Çepni, 2019). TIMMS araştırmaları da aynı şekilde bilgisayar ortamında ölçme ve değerlendirme yapmaktadır (MEB, 2020). Uluslararası sınavlar çevrimiçi ortamlarda uygulanmaktadır. Böylelikle maliyet, zaman kaybını azaltmaktadır. Ayrıca birçok veriye ulaşma imkânı sağladığından çok yönlü değerlendirme yapma olanağı sunmaktadır. Bu nedenle çevrimiçi ugulamalara öğrencilerin alışık olmaları gerekmektedir.

2019 yılında Çin'de başlayıp bütün dünyaya yayılan Koronavirüs (covid-19) ülkelerin çöşitli önlemler almasına neden olmuştur. 11 Mart 2020 tarihinde Dünya Sağlık Örgütü (WHO) tarafından ilan edilen Covid-19 pandemisi ile ülkeler kapanmaya gitmiş, insanların toplanmalarının önüne geçmek hastalığın yayılmasını engellemek için bir araya gelinen etkinliklerde kısıtlamaya gidilmiştir. Bu amaç doğrultusunda tüm dünyada olduğu gibi ülkemizde de eğitime önce ara verilmiş daha sonra eğitim çevrimiçi ortama aktarılmıştır. Milli Eğitim

Bakanlığı dijital platformda Eğitim Bilişim Ağı (EBA) üzerinden öğretmen ve öğrencileri buluşturmaya çalışmıştır. İmkânı olmayan öğrenciler için EBA TV ile onlara ulaşmaya çalışmıştır. Bu sürece uyum sağlamada sorunlar ortaya çıksada eğitimin kayıpları önlenmeye çalışmıştır (Telli ve Altun, 2021). Hem öğretmenler hem de öğrenciler çevrimiçi öğrenme ortamlarına alışmakta zorluk yaşamışlar. Bu nedenle çevrimiçi öğrenme ortamlarını kullanma önemli bir duruma gelmiştir.

Literatürde yeni nesil sorular üzerine araştırmaların kısıtlı sayıda olmasının yanında son yıllarda yaşadığımız pandemi ile birlikte eğitim sisteminin odak noktası değişti. Eğitim sisteminin odak noktasının değişmesiyle birlikte eğitim, çevrimiçi öğrenme ortamlarında yürütülmeye başlanmıştır. Ayrıca sınavlar bilgisayar destekli çevrimiçi ortamlarda değerlendirmeye doğru bir yönelim vardır. Bu çalışma ile öğrencilerin çevrimiçi öğrenme ortamlarında yeni nesil sorulara dayalı fen eğitimine karşı görüşleri belirlenmeye çalışılmıştır.

Yöntem

Bu çalışmada nitel araştırma yöntemlerinden biri olan tarama yöntemi kullanılmıştır. Nitel araştırma yöntemi ile problem durumu hakkında derinlemesine araştırmalar yapılabilir. Hızla değişen dünyamızda insanlar değişimlere uyum sağlamakta sorunlar yaşamakta ve bu duruma alışmakta zorluk çekmektedir. Nitel araştırma yöntemiyle ortaya çıkan bu problemler derinlemesine incelenmekte ve bireylerin düşüncelerini ortaya çıkarılmaktadır (Seggie ve Bayyurt, 2021).

Araştırma 2020-2021 eğitim-öğretim yılında çevrimiçi öğrenme ortamına katılan 7. sınıf öğrencileri ile gerçekleştirilmiştir. Eğitime katılan 18 öğrenciden başarılı ve başarısız öğrenciler arasından 4 öğrenci seçilerek bu öğrencilerle yarı yapılandırılmış görüşmeler yapılmıştır. Toplam 8 öğrenci ile yapılan çalışmada görüşmeler ses kaydına alınmıştır. Araştırmacı yarı yapılandırılmış görüşme sorularına uygun nitelikte 8 sorudan oluşan bir ön görüşme formu hazırlamıştır. Sorular öğretim üyesinin görüşleri ve önerileri doğrultusunda 7 soruya düşürülmüş ve düzenlenmiştir.

Öğrencilerle online öğrenme ortamında "Işığın Madde ile Etkileşimi" ünitesi işlenmiştir. Pandemi sürecindeki bu çalışma çevrimiçi öğrenme ortamında EBA canlı ders uygulaması üzerinde yapılmıştır. Dersler öğretmen ve öğrenciyi farklı mekanlarda aynı zaman diliminde birbirleriyle buluşturmuştur. Üniteler Fen Öğretim Programının temel aldığı yapılandırmacılık anlayışına uygun şekilde video, slayt, z-kitap, soru-cevap, anlatım gibi yöntem ve tekniklerden yararlanılarak işlenmiştir. Konu işlenirken Milli Eğitim Bakanlığı tarafından yayınlanan ve kaynaklardan yararlanılarak oluşturulan yeni nesil sorular öğrencilere yansıtıldı. Sorular öğrencilerle tartışıldı ve çözüldü. Böylece öğrencilere konu ile ilgili daha iyi bir şekilde kavramlar kazandırılmaya çalışılmış, pekiştirilmiş ve öğrencilerin anlamalarını kolaylaştırmaya yardımcı olunmuştur.

Çalışma sonrasında seçilen öğrencilerle yarı yapılandırılmış görüşmeler yapılmış ve bu görüşmeler ses kaydına alınmıştır. Ses kayıtları dinlenmiş ve öğrencilerin cevapları yazıya aktarılmıştır. Öğrencilerle yapılan görüşmede elde edilen veriler içerik analizi yöntemine göre çözümlenmeye çalışılmıştır. İçerik analizi yapılırken kodlar kullanılmıştır. Öğrencilerin verdikleri

cevaplara göre kodlar oluşturulmuştur. Böylece nitel verilerin daha kolay yorumlanabilmesi durumu ortaya çıkmıştır.

Bulgular

Öğrencilerle yapılan görüşmeler sonucunda öğrencilerin verdikleri cevaplar araştırmanın bulgular bölümünü oluşturmuştur. Yapılan görüşmede çok sayıda öğrenci, yeni nesil soruların zor ve karmaşık olduğunu söylemiştir. Yeni nesil soruların geleneksel sorulara göre daha uzun, zaman alıcı, yorumlamaya dayalı ve olaylar arası ilişki kurmaya yönelik olduğu öğrenciler tarafından fark edilmiştir. Öğrenciler yeni nesil sorularla problem çözme, okuduğunu anlama ve deney yapma gibi becerilerini geliştirdiklerini belirtmişlerdir. Soruların konularla ilgili bilgiler sunması öğrencilerin öğrenmelerini pekiştirmeye yardımcı olduğunu ifade etmişlerdir. Öğrenciler yeni nesil soruların okumaya dayalı olması ve düşündürücü sorular olmasını zorlanmalarına gerekçe olarak sunmuşlardır. Bu sorularda günlük hayattan örnekler bulduklarını söylediler. Öğrenci motivasyonunu artırdığını ve yeni nesil sorularda öğrencilerin özgüvenlerinin gelişmesine katkı sağladığını belirtmişlerdir.

Sonuç ve Tartışma

Öğrenciler soruların uzun olduğunu, okumaya dayalı olduğunu, bağlantılar kurduğunu ve olaylar hakkında düşündürdüğünü ve bu durumun kendilerini yorumlamaya zorladığını belirtmişlerdir. Bu tür cevapların öğrencilerimizin okuma alışkanlığının olmaması, düşünmeye ve yorumlamaya dayalı soruları yeterince çözememelerinden kaynaklandığı düşünülmektedir.

Öğrenciler yeni nesil sorular arasında bazen kendi hayatlarında karşılaşmadıkları problemlerin olduğunu belirtmişlerdir. Bu durum soru hazırlayanların soruları öğrencilere göre hazırlamadıkları düşüncesini ortaya koymaktadır. Bu nedenle nitelikli yeni nesil soru oluşturma ve bulma konusunda zorluklar olduğu düşünülmektedir (Erden, 2020).

Öğrenciler, yeni nesil soruların mantıksal düşünmeyi, yorumlamayı, yeni bilgileri öğretmeye yardımcı olduğunu belirtmişlerdir. Bu nedenle konuların işlenmesi ve değerlendirilmesi sürecinde yeni nesil soruları çözmenin önemini ortaya koymaktadır.

Öğrenciler bazı yeni nesil sorularda kendi hayatlarından uygun örnekler bulamadıklarını belirtmişlerdir. Literatürde yeni nesil soruların oluşturulmasında dikkat edilmesi gereken hususlar arasında bağlamın öğrenciye göre olması ve senaryoların iyi kurgulanması öğrenciyi desteklemektedir (Elmas ve Eryılmaz, 2015; Kabuklu vd., 2019).

Yeni nesil sorulara alışık olmayan öğrenciler zorlandıklarını söylediler. Bunun nedeni, yeni nesil soruların ders kitaplarında yeterince yer almaması, öğrencilerin yeni nesil sorulara alışık olmaması ve müfredat ile ders kitaplarının uyuşmamasıdır (Erden, 2020; Tekbıyık ve Akdeniz, 2010; Ünal, 2019).

Öneriler

Akademik ve bilimsel süreç becerilerine katkı sağladığı için öğrencilerin yeni nesil soruları çözmeleri önerilmektedir. Öğretmenlerin öğrencilerine yeni nesil sorular yöneltmeleri önerilmektedir. Okul ders kitaplarının güncellenerek yeni nesil soru sayısının arttırılması önerilmektedir. Yardımcı kaynakların yeni nesil soru sayısını artırması önerilir.