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# Analysis of Turkish-Islamic Scientists Covered in Turkish and Azerbaijani Science Textbooks

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**ABSTRACT**

The aim of this research is to determine the extent to which Turkish-Islamic scientists are included in the science textbooks used in secondary schools in Turkey and Azerbaijan, two countries with common cultural history. Within this framework, the textbooks prepared according to the current science course curriculum in Turkey and Azerbaijan have been examined by document analysis within the scope of qualitative research. According to the data obtained from the study, western scientists are given more space in textbooks both in Turkey and Azerbaijan, while Turkish-Islamic scientists and their scientific studies are less included. It has been presented as a suggestion that including Turkish-Islamic scientists from Turkey and Azerbaijan in the textbooks in both countries will motivate students towards science.

**Keywords:** History of science, science, scientists, textbooks

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## 1. INTRODUCTION

In the 21st century we are in, it is possible to see that there are contents in which teaching approaches, techniques and materials used in science learning vary. Structural Approach, Research and Inquiry-Based Learning Approach, STEM Approach, and methods and techniques used within the framework of these approaches can be given as an example. When the education systems are examined, it can be said that textbooks, which are the materials from which students benefit in lessons, are important learning tools. It is clear that scientists' lives and scientific study processes are also included in textbooks besides the information about scientific studies, how they are made, and techniques used in the processes. In this context, it is considered that the studies of the scientists are beneficial to students in learning the science course.

### 1.1. The Importance of Science Textbooks in Science Education

In science education, it is possible to think that the history of science, the contributions of scientists to science and the information about their lives will positively affect students in science learning when they are included in science textbooks. Hulten (2016), although science textbooks represent several improvements in science education, Shapiro (2013) states that science textbooks deeply shaped by the structure of textbook production and distribution. Matthews (1994) says that the scientific studies by scientists in history make the subject content of science more visible to students, thus having a positive effect on science learning. Guisasola, Zuza and Almudi (2013) pointed out that textbooks have an important role to develop the curriculum that may align with various teaching focuses. In this context, it is possible to say that there are various researches when the literature is examined. The amount of learning outcomes can be seen by looking at Turkish Science Course Curriculum. Learning outcomes 5th, 6th and 10th concerning scientists under the heading "Special Objectives of the Curriculum" in the Turkish Science Course Curriculum are as follows (Ministry of National Education, 2018, abbr. MoNE): (a) to develop career awareness and entrepreneurship skills related to science, (b) to help scientists understand how scientific knowledge is created, the processes in which this knowledge is generated, and how it is used in new researches, (c) to ensure the adoption of universal moral values, national and cultural values, and scientific ethical principles.

While explaining Scientific (process) Skills under the heading "Field-Specific Skills in the Curriculum", the above-mentioned curriculum also includes the statement “It covers the skills used by scientists in their study, such as doing an experiment.” The unit “the Solar System and Beyond” in the 7th grade Science Course Curriculum is intended for the students to understand the contributions of Turkish-Islamic scientists to space research in the process of learning the issues and gains within the scope of

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the World and the Universe, and it is stated that the contributions of the Western astronomers and Turkish-Islamic astronomers are also included in this unit.

Science courses in Azerbaijan are taught separately as Physics, Chemistry and Biology courses. The textbooks in Azerbaijan are approved by Ministry of Education of Azerbaijan Republic (MoEoAR). In addition, science subjects are also included in Life Sciences and Technology textbooks. MoEoAR (2020) Textbook policy decisions in general education system include general provisions and basic requirements for the content of textbooks.

General provisions: "The purpose of textbook policy is to provide students with knowledge, skills and habits in accordance with modern standards, to educate them to be physically and spiritually healthy, independent and democratically-minded citizens, who also give importance to their own homeland, people, traditions, and national and universal values." Basic requirements for the content of textbooks: "They should give information about the modern achievements in science, technology and culture, which can be verified and retrieved from authorized sources."

It is seen that there are learning outcomes about scientists in science curriculums in both Azerbaijan and Turkey. It is known that these learning outcomes contain elements that are effective in learning science. Science process skills, scientific knowledge, nature of knowledge and scientific progress is specially defined in learning outcomes. Some elements related to 21st century such as career awareness, entrepreneurship, moral and cultural values, democratically-minded citizens and science-society-environment are paid attention within the scope of learning outcomes.

## 1.2. Studies on the Availability of Scientists in Textbooks

It is known that there are some studies in the literature on textbooks related to science education. In this section, some of them is presented in terms of the study content. Hence, studies on science textbooks including scientists both in Turkey and abroad are examined. These studies can be examined under the Nature of Science (NoS). Ecevit, Yalaki and Kingir (2018), one of the significant subjects of Nature of Science is to express what science is. Science textbooks have an important role in teaching what science is, by showing the scientists and their contributions to science. Solbes and Travers (1996) analyzed 13 Spanish physics and chemistry textbooks with regard to historical content. They concluded that the history of science and its subjects were not a prominent issue in science textbooks. Besides, historical information was not given with its major role instead was given superficial (Leite, 2002; Solbes & Travers, 1996). Yıldırım (2003) reveals that Islamic period covers large societies such as Turks, Persians and Arabs, and that its brightest period has been between the 8th century and the 13th century. It is also known that there are various scientific books for endearing science to students. In the research of İrez (2008), he examines the five most widely-used biology textbooks at the high school level in Turkey in the context of the nature of science. He has found that scientists are universally mentioned as stereotyped and their imaginations, creativity and scientific processes are not included in textbooks. Eijck and Roth (2008) focus on the representations of scientists in four Biology textbooks in Canada. For this purpose, the photos, graphics and diagrams in the textbooks have been examined. Vesterinen, Aksela and Lavonen (2013) examine five of the most popular high school Chemistry textbooks in Finland and Sweden, presenting different aspects of the nature of science. They have concluded that the analyzed textbooks focus on the scientists who created important scientific models in history. Laçin-Simşek (2011) has revealed that there are no Turkish-Islamic scientists in the science textbooks of the 4th, 5th and 6th grades, and eight Turkish-Islamic scientists and studies are included in the textbooks of the 7th and 8th grades. Harre (2014) mentions about the great scientific experiments in his work. It has been determined that the studies of Turkish-Islamic scientists are not included as any important scientific experiments in basic science. Irez (2016) studied ten most commonly used 9th biology textbooks in Turkey. He purposed to evaluate how nature of scientific knowledge represented in 9th grade biology textbooks. İdin and Yalaki (2016) investigated science textbooks used for middle school students in Turkey. They aimed to learn the proportion of Turkish-Islamic scientists given in science textbooks based on science curriculums (1994, 2000, 2005 and 2013 national science curriculums) in Turkey. Yacoubian, Al-Khatib and Mardirossian (2017), examined fifteen Lebanese National Science Textbooks in terms of the framework focused on the individual and work-related characteristics of scientists. They found that Non-Western scientists, including Lebanese and/or Arab scientists are mostly absent in the textbooks. Mills (2018) includes only İbn-i Sina and El-Harizmi in his work, in which he mentions about the people who influenced the age of science and invention since the early ages. McComas and Kampourakis (2015) state that the history of science is not given the necessary value in science education. Göksu and İnaltekin (2020), investigated 33 different science textbooks (biology, chemistry and physics) used in high schools in Turkey. They analyzed their data within some criteria such as gender, nationalities, characteristics, scientific study fields and working environments of scientists. As it can be seen there have not been conducting any study related to study content that are carried out in Turkish and Azerbaijani science textbooks.

## 1.3. Aim and Importance of the Research

It is seen that some studies have been conducted related to science textbooks, scientists, and scientists' inclusion in science textbooks. It is also understood from the literature that inclusion a scientist with his/her scientific study in a Turkish science textbook is not expected level. This idea can be stated for Azerbaijan science textbooks, as well. It has been determined both in the field and in the research that Turkish-Islamic scientists, who have made important contributions to the development of science through their scientific studies, are not included enough in the textbooks. It is thought that the 8th and 12th century has been the Golden Age of Islam in terms of Science, Turkish-Islamic scientists conducted some scientific studies at the major

universities and institutions throughout the world, and these scientists both in Turkey and Azerbaijan should be introduced to students as role models in their career planning. It is understood that the information about the lives and scientific studies of the two countries with a common historical background are limited. It is possible to say that the research has an authentic value in this aspect. Another significant issue is some students both in Turkey and Azerbaijan can think that only western scientists mostly do carry out science and scientific experiments, by looking at science textbooks. The aim of this research is to determine the degree to which Turkish-Islamic scientists, who have contributed to science, are included in the science textbooks used in secondary schools in Turkey and Azerbaijan, two countries with a common history of culture.

## 2. METHODOLOGY

Four science courses at secondary school level in Turkey have been examined within the scope of the research. It has been determined that the subjects of science course in Azerbaijan are included in Life Sciences, Technology, Physics, Chemistry and Biology textbooks. For this reason, twelve textbooks used in Azerbaijan have been examined.

### 2.1. Type of Research

Document analysis technique, which is one of the qualitative research methods, has been selected to be used within the framework of the research. Document analysis is the determination of the concepts or expressions in the content through the analysis of written materials that provide information on the cases or facts that are projected to be investigated. (Busch et al., 2012; Yıldırım & Şimşek, 2011). Science textbooks in this research are written materials used in the secondary schools in Turkey and Azerbaijan. There are two basic types in content analysis, which are conceptual and relational (Busch et al., 2012). Conceptual analysis has been used in the study for the purpose of understanding the frequency and importance of a concept in a text or an expression.

### 2.2. Data Collection Tools

The science textbooks (MoNE, 2019) approved by MoNE to be taught in schools according to the 2017-2018 Academic Science Course Curriculum, and Life Sciences, Physics, Chemistry, Biology, Technology textbooks approved by The Ministry of Education in Azerbaijan and used from the 2017-2018 Academic Year to date at schools have been examined as a data source in this research. Four Science courses at secondary school level in Turkey have been examined within the scope of the research. It has been determined that the subjects of science course in Azerbaijan are included in Life Sciences, Technology, Physics, Chemistry and Biology textbooks. It has been examined in which units, subjects or at which pages the scientists and their works or studies are included and what their contents are in twelve textbooks in both Turkey and Azerbaijan.

### 2.3. Analysis of Data

Conceptual content analysis in the study has been carried out in the following process (İdin & Yalaki, 2016):

1. The question of the research has been revealed.
2. The scientist has been identified as the concept to be encoded and it has been decided to encode this concept only at the level of the names of scientists.
3. It has been decided to determine whether the names of scientists exist rather than the frequency of them in the textbooks.
4. It has been examined to what extent and in which details the scientists have been issued.
5. The encodings at issue have been created according to these rules and interpreted in the numbered list.

### 2.4. Reliability and Validity

In order to achieve the validity of the research, the names of the scientists included in the textbooks have been taken as the basic data. Thus, determining where in the textbooks the scientists and their works have been presented has made it easier for the validity to be obtained. In order to achieve the reliability, a researcher and an expert on qualitative research have provided consensus by reviewing the data obtained.

## 3. FINDINGS

### 3.1. Findings on Textbooks in Turkey

Information about the scientists in the 5th grade Science Textbook (MoNE, 2019a) is given in Table 1.

Table 1.
*Scientists in the 5th Grade Science Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1.Galileo Galilei | Sun, Earth and Moon | Heroes of Science | He concluded that the Sun is making a rotation around its axis. | 22 |
| 2.Yuri Gagarin | | It's Your Turn (Text box) | It is stated that he made a travel on space. | 32 |
| 3.Ali Kuşçu | | Heroes of Science | His scientific studies and discoveries related to Astronomy and information about his life are briefly presented. | 40 |
| 4.Newton, 5.Kepler, 6.Galileo, 7.Archimedes | | Unit Evaluation Questions | It is asked which scientist a scientific invention belongs to. | |
| 8.Aristotle | | Heroes of Science | Information about the world and classification of living creatures is included. | 56 |
| 9.Carolus 10.Linnaeus | | Heroes of Science | Information that he is the scientist who made the classification of living things, which is also accepted today | 56 |
| 11.Isaac Newton | Measuring Force | Heroes of Science | His scientific studies on Science and Astronomy and the laws he found in modern Physics in particular have been given by storytelling. | 85 |
| No scientists have been included. | Matter and Change | | | |
| 12.İbn-i Heysem | Light Propagation | | It is stated that he is the first person to scientifically explain how we see, that he studied Mathematics, Astronomy, Medicine and Physics, and that he found the principle for inventing cameras. | 182 |
| 13.Rachel Louise Carson | Human and Environment | Heroes of Science | It is revealed that he worked on DDT, its harm to the environment and the negative effects it causes to people. | 228 |
| 14.Nikola Tesla and, 15.Thomas Alva Edison | Electrical Circuit Elements | Heroes of Science | There is the information about where they are from and the fact that they added to Science the important discoveries they made (especially with electricity). | |

No scientists are included in the Solar, Earth and Moon unit and the Substance and Exchange unit. A total of 15 scientists are included in the remaining five units of the book. Ten scientists' contribution to Science is revealed within the framework of the subject in the unit at issue under the title of Heroes of Science. The questions about four scientists, (Newton, Kepler, Galileo and Archimedes), are asked in unit evaluation part in the form of an information question and students are asked to give an answer to find the right scientist. Information has been given about the important works of Turkish-Islamic scientists such as Ibn al-Haytham and Ali Kuşçu. Information about the scientists in the 6th grade Science Textbook (MoNE, 2019b) is given in table 2.

Table 2.
*Scientists in the 6th Grade Science Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1.Ali Kuşçu | Solar System and Eclipses | Pioneers in Science | His important studies on Mathematics and Astronomy and information about his works have been included, and it is stated that he was one of the famous scientists of his period. | 23 |
| 2.Canan Dağdeviren | Systems in Our Bodies | Pioneers in Science | It is stated that he is a Physics engineer and he is one of the world's most important scientists with his work in the field of Medical Technology and inventions (the device that diagnoses skin cancer by pacemaker). | 49 |
| 3. Ibn al-Haytham | Force and Movement | Pioneers in Science | His nationality, in which scientific fields he studied, where he lived, and that he was a source for Newton's law of motion is stated here. | 82 |
| 4.Avicenna | Systems in Our Bodies and Health | Pioneers in Science | Why he is important for the scientific world, that his works are valued at prestigious universities around the world and his important studies in the field of Medicine have been issued. | 217 |

| | | | | |
|---|---|---|---|---|
| 5.George Simon Ohm | Transmission of Electricity | Pioneers in Science | His life, his important studies on electricity and the law of Ohm, which he found, have been issued. | 238 |

At least one scientist is mentioned in all units of the textbook. Those except George Simon Ohm are Turkish-Islamic scientists. The information about the Turkish scientists with important scientific studies at an international level in the fields of basic sciences is included in the 6th grade textbook. The textbook also includes the information about what they added to the world of science. Information about the scientists in the 7th grade science textbook (MoNE, 2019c) is given in table 3.

Table 3.
*Scientists in the 7th Grade Science Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1.Galileo | Solar System and Beyond | Telescope | Galileo managed to build a telescope. | 24, 26 |
| 2.Isaac Newton | | Text Box | Newton used a mirror in his telescope in order to to collect light. | 26 |
| 3.William Herchel | | Text Box | Herchel discovered Uranus, he invented the largest telescope of his time in England and he invented Saturn's and Uranus' satellites thanks to this telescope. | 26 |
| 4.Edwin Hubble | | Text Box | The images of tens of thousands of galaxies can be obtained via the Hubble space telescope. | 26 |
| 5.Ali Kuşçu | | Text Box | The information about his life and important works, and that he was an important astronomer and Mathematics scholar. | 27 |
| 6.Antonie Van Leeuwenhoek | | Text Box | He was the first scientist to observe the living creatures with his own microscope. | 27 |
| 7.Zacharias Janssen | Cell and Divisions | DNA, GENE, Chromosome | The assumption that Janssen developed the microscope. | 56 |
| 8.Robert Hook | | DNA, GENE, Chromosome | Hook was the first to identify the term cell. | 56 |
| 9.Theodar Schwann and 10.Matthias Schleiden | | DNA, GENE, Chromosome | They revealed that plant and animal cells are basically composed of the same structures. | 57 |
| 11.Rudolf Virchow | | Information | Virchow explained the "Cell Theory". | 57 |
| 12. Aziz Sancar | | Let's Investigate Discuss | Aziz Sancar's words and the Nobel Prize he received in Chemistry. | 57 |
| 13.Democritus<br>14.John Dalton<br>15.John Thomson | Pure Substances and Mixtures | Information | It has been stated that the first opinion about atoms belongs to Democritus and that substances consist of particles. He owns the first scientific view about atoms and his scientific views.<br>Thompson's scientific opinions on the atomic model. | 112 |
| 16.Ernest Rutherford | | | His discovery of the nucleus and the information that the mass of a nucleus is approximately equal to the mass of an atom. | 113 |
| 17.Niels Bohr | | Atomic Models | The Bohr Atomic Model and the Bohr Atomic Theory are mentioned. | 113 |
| 18. Ibn al-Haytham | The interaction of light with matter | Do you know all of these? | His life and important works and information about the linear spread of light, features of shadows, dark room, reflection and refraction. | 172 |
| 19.Georg Simon Ohm | Electrical Circuits | | The description and features of the Law of Ohm and information about by whom it was discovered. | 216 |

Three of the 20 scientists in the book are Turkish-Islamic scientists. Besides, it has been determined that the studies of Aziz Sancar, one of the important scientists recently, has been included. The scientists (accompanied by their photographs) are often expressed with their life processes and the studies they made in science. For example, Robert Hook is mentioned as "the first person to describe the term cell within the scope of the unit DNA, GEN, Chromosome. The studies that the scientists did within the scope of the relevant subject is given in one or more sentences with the scientists' being mentioned in the subject discourse. Information about the scientists in the 8th grade science textbook (SDR Dikey Publishing, 2019) is given in table 4.

Table 4.
*Scientists in the 8th Grade Science Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1.Milton Blake & 2. Benjamin Green | Seasons and Climate | Science And Eng. Apps | The story of sunscreen | 45 |
| 3.Gregor Mendel | DNA and Genetic code | | Process of transferring hereditary properties intergenerational, | 45 |
| 4.Louis Pasteur | | Science And Eng. Apps | The Story of Pasteurization | |
| 5.Evangelista Torricelli | Pressure | | He is an Italian scholar in Physics and Mathematics, his life and the Torricelli Experiment. | 85 |
| 6.Blaise Pascal | | Liquid Pressure | Information about Pascal Principle | 87 |
| 7.Erik Rotheim | | Science And Eng. Apps | The process of inventing the spray tube | |
| 8. Johann Wolfgang Döbereiner | Matter and Industry | Periodic System | Döbereiner is the first person to classify the elements according to their physical and chemical features. | 100 |
| 9.Dimitri Ivanovic Mendeleyev | | Periodic System | Mendeleyev listed the elements according to their increasing atomic masses. | 100 |
| 10.Henry Moseley | | Periodic System | He identified the correct atomic numbers, determined the elements according to the increasing atomic numbers, and periodic system. | 101 |
| 11.Glenn Seaborg | | Periodic System | Seaborg is the person who regulated the two sequence elements under the Periodic System and finalized the periodic system used today. | 101 |
| 12.Linus Pauling | | Do you know all of these? | Pauling is the person who makes a theoretical prediction that rare gases can have compounds. | 105 |
| 13.Neil Bartlett | | Do you know all of these? | He is the first person to synthesize rare gas compounds. | 105 |
| 14.Georges Clouda | | Science And Eng. Apps | Neon Light Story: He has been the one who discovered neon lights. | |
| 15.Charles Henry Gould | Simple Machines | Science And Eng. Apps | He invented the stapler. | 178 |
| 16.Hippolyte Mège-Mouriès | Energy Trans. & Env. Sci. | Science And Eng. Apps | He is the first person to get margarine. | 220 |
| 17.Chester F. Carlson | Elec. Loads & Elec. Power | Science And Eng. Apps | He is an American and the first person to invent the copier machine. | 251 |

The 8th Grade science textbook used in Turkey has been prepared by a private publisher and approved by MoNE. Eighteen scientists in total, at least one scientist for each unit, are included in the textbook. In this context, it has been observed that no Turkish-Islamic scientists and scientific studies have been included in the textbook. The scientists mentioned in the book are often those who made a discovery, an invention, or created a product. The relevant scientists have been mentioned in the unit of "Science and Engineering Applications" eight times and the information about them is general (e.g. information about Erik Rotheim). It is the same in the unit of "Do You Know All of These?". The scientists herein have been mentioned in one or more sentences with the relevant scientific studies and products they made. For example, it has been stated that Neil Bartlett is a scientist who synthesized the first genealogy compounds. The process has been observed to be the same when explaining the subjects within the scope of the units. The information that Dimitri Ivanovic Mendeleyev listed the elements according to their increasing atomic masses has been given in the subject of "Periodic System".

### 3.2. Findings on Textbooks in Azerbaijan

Science courses in Azerbaijan are taught separately as Physics, Chemistry and Biology courses. In addition, science subjects are included in Life Sciences and Technology textbooks. The textbooks used for science courses in Azerbaijan have been given according to their grade level.

Science subjects in the 5th grade Life Sciences textbooks are Let's Travel and Learn the Nature, Natural Disasters/Natural Events, The Secret of Events in the Solar System (Galaxies, satellites, events that occur) and the Movement of the Earth around the Sun. When these subjects of Life Sciences course have been examined, it has been determined that the scientists, who had studies on relevant subjects, are not included in the textbook. Science topics in 5th Grade Technology textbooks are General Information About Metals, Combining Metal and Electrical Energy and Basic Electrical Circuit. When these subjects of Technology course have been examined, it has been determined that the scientists, who had studies on relevant subjects, are not included in the textbook. Information about the scientists in the 6th grade Biology (MoEoAR, 2017a) textbook is given in table 5.

Table 5.
*Scientists in the 6th Grade Biology Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1.Aristotle | Science of Living Organisms | | Information that the first scientific works on the creatures were written by the ancient Greek scholar Aristotle ("*History of animals*") and Theophrastus ("*The History of Plants and Animals*"). | 12 |
| 2. Carl Linnaeus | | Information Box Laboratory | Carl Linnaeus classified the previously determined Latin names for each species. | 17 |
| 3. Carl Linnaeus | | Information Box | The first scientific classification was carried out by Swedish scholar Carl Linnaeus. | 17 |
| 4. Robert Hooke | | Cell | In 1665, Hooke microscoped the tree's mushroom and found that it consists of small structures. He described these small structures as cells. | 27 |
| 5. Antonie van Leeuwenhoek | | Cell | Antoni van Leeuwenhoek discovered single-celled creatures for the first time with the microscope that he did on his own. | 27 |
| 6. Robert Hooke | | Cell | The British scholar. He created the concept of cell. | 27 |
| 7. Antonie van Leeuwenhoek | | Single-celled and Multi-cellular Organisms | Dutch scholar Leeuwenhoek saw multicellular living creatures in the water and described them as small animals. | 37 |
| 8.Leonardo da Vinci | | Structure of the Body | Italian painter Leonardo da Vinci (1452–1519) first suggested that the age of the tree be determined via the rings. | 54 |
| 9. Jan Baptist van Helmont | | Aerial Alignment of Plants Photosynthesis | Helmont found that the plant took the necessary ingredients from the water, not the soil, in order to grow. | 94 |

No Turkish-Islamic scientists are included in the 6th Grade Biology textbook. The information about the nationality and work of the relevant scientist has been issued. It has been determined that the names of the scientists are given in Azerbaijani language. ATRTN (2017b), Information about the scientists in the 6th grade Physics textbook is given in table 6.

Table 6.
*Scientists in the 6th Grade Physics Textbook*

| Scientist | Unit | Topic | Content | Page |
|---|---|---|---|---|
| 1. Aristotle | | | An ancient Greek philosopher and a scientist. He created the concept of Physics for the first time in his book *Physics*. | 11 |
| 2. Bahmanyar | | | Azerbaijani philosopher. He mentioned "Physics" in Azerbaijani language for the first time in his work "*Perception*". | 11 |
| 3. Galileo Galilei and 4.Aristotle | | | The experimental method in Physics was first found by Italian scholar Galileo Galilei. (This information passes two times on the page.) | 17 |
| 5. Isaac Newton 6. James Clerk Maxwell 7. Albert Einstein | | Do you know? | The first scientific work in Physics is accepted as "*Classical Mechanic*" by British Physicist Isaak Newton. This work identifies the laws of movement and mutual interaction of the objects. British Physicist James Clerk Maxwell revealed the theory of "Electromagnetic field". American physicist Albert Einstein revealed the "Theory of Relativity." | 18 |
| 8. Albert Einstein | | | German-U.S. physicist. He identified the theory of relativity. | 18 |

There are seven scientists in the textbook. Scientists except from "Abülhesen Bəhmənyar əl-Azərbaycani" have been observed to be of Western origin. In the Physics textbook, the researches, works and inventions of the scientists in the Physics book are often given in the form of short information within the scope of Chemistry. Information about the scientists in the 6th grade Life Sciences textbook MoEoAR (2017c) is given in table 7.

Table 7.
*Scientists in the 6th Grade Life Sciences Textbook*

| Scientist | Unit | Topic | Content | Page |
|---|---|---|---|---|
| 1. Democritus | From Not Living to Living | Classification of Substances | Democritus, the ancient Greek philosopher, first mentioned nearly 2,500 years ago that the substances consist of undivided structures. | 42 |
| 2. Arthur Schopenhauer | From Not Living to Living | Conditions of Health | German philosopher. Health is not everything, but without health, everything is nothing. | 61 |

In the unit of Classification of Substances in Life Sciences course, it is stated that it was Democritus (Demokrit) who put forward for the first time the definition of atoms. Arthur Schopenhauer's word about health is included in Conditions of Health. Arthur Schopenhauer is also introduced as a German philosopher.

The subjects in the 6th grade Technology textbook MoEoAR (2017d) are The Ways for Generation and Use of Electrical Energy, The Simplest Electrical Circuit, Food Crops in Human Life, Fats, Carbohydrates, Vitamins and Preparation Technology of Dairy Products. Technology textbook does not cover any work, study or life story of any scientist. Information about the scientists in the 7th grade Chemistry textbook MoEoAR (2014) is given in table 8.

Table 8.
*Scientists in the 7th Grade Chemistry Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1. John Dalton | First Chemical Suggestions | | The British scholar played a major role in explaining the atomic-molecule structure in 1803. | 24 |
| 2. Jöns Jacob Berzelius | | Signs and Naming of Chemical Elements | In 1814, prominent Swedish chemist Jöns Jacob Berzelius offered to sign the chemical elements with the initial letters of their name in Latin language. | 25 |
| 3. Jöns Jacob Berzelius | | " " | The Swedish chemist, in 1814, he added the signs of chemical elements into Science. | 26 |

| | | | | |
|---|---|---|---|---|
| 4Joseph Louis Proust | Physical and Chemical Events and Chemical Techniques | Chemical Formulas, Law of Constant | French chemist. Between 1799 and 1806, he suggested the structure of oxides, sulfates and other substances. | |
| 5. Edward Frankland | " " | | The British chemist. He suggested an idea of the force bonding atoms to each other. | 37 |
| 6. Amedeo Avogadro | | | (1776-1856) Italian scholar. He discovered a law of gases in 1811, later this law was called in his name. | 43 |
| 7. Epicurus<br>8. Pierre Gassendi<br>9.Robert Boyle | | Law of Constant Proportions Matter and Mass | For the first time, the Greek philosopher Epicurus said there is a law, conservation of matters, and in the Middle Ages, the French scholar Pierre Gassendi and later English scholar Robert Boyle took advantage of acknowledging that there is such a law. | 52 |
| 10. Mikhail Lomonosov | | | German scholar Euler stated for the first time in his letter that there is such a law as conservation of matter mass in 1748. | 53 |
| 11. Antoine Lavoisier | | | French scholar Antoine Lavoisier, unaware of M. Lomonosov's studies, proved that masses remain constant, while he experienced the water's hydrogen and oxygen compound, and he again proved the law of "Constant Proportions of Matter" and added it into Chemistry field. | |
| 12. Carl Wilhelm Scheele | Oxygen, Air, Burning | Oxygen as a Chemical Element | Swedish scholar Carl Wilhelm Scheele discovered the oxygen element in 1772. | 54 |
| 13. Antoine Lavoisier | | " " | In 1774, the French chemist found with an experiment that the weather is a mixture. | 55 |
| 14. Henry Cavendish | | | English scholar. In 1766, he obtained hydrogen in its pure state. He accepted the Theory of Burning depending on the lightness of hydrogen. | 76 |

Researches, works and inventions of the scientists included in the Chemistry textbook are often given in the form of a short information. The 7th Grade Life Sciences textbook, MoEoAR (2018a) covers the unit "Our Environment" (The environment that surround us) within the scope of science. This unit includes subjects such as "Motion is a feature of meter, Interactions in nature, Energy and energy transformations, Human, environment and forests are the lungs of our planet". When these units have been examined, it is observed that no scientist's works or life story have been included.

Information about the scientists in the 7th grade biology textbook MoEoAR (2018b) is given below. The units in the textbook are "Diversity in the World of Living Creatures, Diversity in the World of Plants, Bacteria and Fungi, Diversity in the Animal Kingdom" is given in table 9.

Table 9.
*Scientists in the 7th Grade Biology Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1. Peter Simon Pallas<br>2. Alexander Kovalevsky | | Animals with Chorda, Headless, fish, amphibians and reptiles | Text Box: In 1778, Simon Pallas became the first person to examine the structure of the Black Sea scorpion and connect it to the mollusk. However, it has been later determined by Alexander Kovalevsky that it belongs to the chordas. | 98 |

In the 7th Class Biology textbook, the number of scientists is a very limited. Simon Pallas and Alexander Kovalevsky and their scientific studies on the classification of animals are briefly explained. Information about the scientists in the 7th grade Physics textbook MoEoAR (2018c) is given in table 10.

Table 10.
*Scientists in the 7th Grade Physics Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| | | Newton's Second Law | Text Box: Great British physicist. He set the laws of mechanical movement, the interaction of objects and the universal law of attraction. | 36 |
| 1. Isaac Newton | | | British scientist Isaac Newton measured the dependence of the gravity on the mass of the objects and the distance between these objects as the universal 'Law of Gravity'. | 40 |
| 2. Galileo Galilei | | Free Fall | Italian scientist Galileo Galilei experienced the acceleration of free fall. | 43 |
| 3. C. Coulun | | Mechanical Work | | 57 |
| 4.C. Vattin | | Force | Force was accepted in BS in honor of British scientist C. Watt (1736-1819) and named as W. | 59 |
| 5.Blaise Pascal | | Pressure Transmission in Liquids and Gases | French scientist | 82 |
| 6.Archimedes | | | He identified a number of important properties of liquids and gases. | 93 |
| 7.Archimedes | | Text Box | Ancient Greek (Sicily, Syracuse) scientist and engineer. He is the creature of many simple mechanisms. | 93 |
| 8.C. Huygens | | Do you know? | The first 'pendulum clock' was created by Dutch scientist X. Huygens in 1656. The Dance Theory, formulated by Christian Huygens in 1673, played an important role in solving the mystery of light waves. | 122 |

Researches, works and inventions of the scientists in the Physics textbook are often given in the form of a short information within the scope of chemical science. While some of the scientists included in the Physics textbook are given in the discourse, some of them are told in the Text Box by giving information. It has been also determined that the subject "Do You Know" also covers the studies of the scientists. Eight scientists are included in the Chemistry textbook. It has been determined that there are no Turkish-Islamic scientists included, who worked/works on the subjects in the book.

The 7th class Technology textbook MoEoAR (2018d) covers the units "Wood processing technology, Simple iron works, Electrotechnical works, Metal processing technology, Crop processing technology and Part processing technology. When these units are examined, it is observed that no scientist's works or life stories are included. Information about the scientists in the 8th grade Physics textbook MoEoAR (2015a) is given in table 11.

Researches, works and inventions of the scientists in the Physics textbook are often given in the form of a short information. While some of the scientists included in the Physics textbook are given in the discourse, some of them are told in the Text Box by giving information. Information about the works and inventions of scientists on the subject is briefly given in the title "Do You Know?.

Table 11.
*Scientists in the 8th Grade Physics Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1.William Tomson (Lord Kelvin) | | Text box | In 1848, British physicist William Thomson (Lord Kelvin) proposed a new scale of temperature. | 18 |
| 2. Joseph John Thomson | | Structure of Atom | The first particle with a negative electrical charge was discovered in 1897 by British scientist Joseph Thomson. | 116 |
| 3. Ernest Rezerford | | | This particle was identified in 1911 by British physicist Ernest Rutherford. | |
| 4. Joseph John Thomson | | | The British scientist discovered Electron and proposed the first model of the atom. | |

| | | | |
|---|---|---|---|
| 5. Ernest Rezerford | | A British scientist proposed a planetary model of atom and performed its first artificial nuclear reaction. | |
| 6. Michael Faraday | Electrical Loads | The British discovered the laws of various physical-electrical events. | 130 |
| 7. Charles-Augustin de Coulomb | Text Box | The French experimentally identified the laws of interaction of physically electrical bodies. | 133 |
| 8.Alessandro Volta | Electrical Power | Text Box-Alessandro Volta (1745-1827), Italian scientist | 153 |
| 9. Luigi Galvani | Do You Know? | The first galvanic element in history was made in Baghdad 3,800 years before L. Galvani. | 154 |
| 10. Alessandro Volta<br>11. Vasily Vladimirovich Petrov | Effects of Electric Current | The effects of the current on lighting were studied by many scientists: Italian scientist A. Volta, Russian inventor V. Petrov (invented the electric arc) and P. Yablochkov (applied the electric arc to lightning), American inventor T. Edison and others. | 158 |
| 12. André-Marie Ampère | Text Box | Andre Marie Ampère (1775-1836), French scientist. He is one of the founders of the teachings of electricity and magnetism. He defined the law of interaction of current wires (Amper Law) and developed various devices to implement the magnetic effect of current wires. | 163 |
| 13. Georg Ohm | Ohm Law for Circuit Part | Text Box- Georg Ohm (1787-1854), The German scientist determined the regularity between current, voltage and resistance on physical electric circuit. | 171 |
| 14. James Prescott Joule | Text box | British physicist, He examined the thermal effects of the electrical current. BS accepted “coul” as an energy unit for his honor. | 190 |
| 15. Heinrich Friedrich Emil Lenz | | Russian physicist. He examined the electromagnetic field, identified the direction of the current produced by the magnetic effect and examined the thermal effect of the electrical current. | 190 |

The Physics textbook covers a total of nineteen scientists. In addition, the works of the two engineers (Otto Nikolaus and Rudolf Diesel) are also included in the textbook. One Turkish-Islamic scholar, who studied on the subjects in the book, is also included in the textbook. Under the title of "Do You Know?, Lager Hasan Chalabi is issued as in the following: The first manned flight with a jet engine was successfully operated by Turkish inventor Lagâri Hasan Çelebi in 1633. Information about the scientists in the 8th grade Chemistry textbook MoEoAR (2015c) is given in Table 12.

Researches, works and inventions of the scientists in the Chemistry textbook are often given in the form of a short information. It has been found that nine scientists have been included in the textbook, including no Turkish-Islamic scientists, who contributed to Chemistry. Information about the scientists in the 8th grade Life Sciences textbook MoEoAR (2015b) is given in Table 13.

Table 12.
*Scientists in the 8th Grade Chemistry Textbook*

| Scientist | Unit | Topic | Content | Page |
|---|---|---|---|---|
| 1. Henry Louis Le Chatelier | | Factors affecting Chemical Balance | The effect of conditions on chemical balance is determined by the principle of Le Chatelier (named in honor of French scientist Le Chatelier). | 62 |
| 2. Johann Wolfgang Döbereiner | System and Structure of Atom | Periodic of Chemical Elements | The first scientific attempt in this field was made in 1828 by German scientist Döbereiner. He said that the characteristics of elements in triads change periodically. | 69 |
| 3. John Newlands | System and Structure of Atom | Periodic of Chemical Elements | In 1864, British scientist John Newlands discovered that there were seven elements. In these groups, he showed that the eighth one of the elements that come after seven elements repeats the characteristics of the previous one or shows similar characteristics. John Newlands called it "Octave Rule." | 69 |

| | | | |
|---|---|---|---|
| 4. Alexandre-Emile Béguyer de Chancourtois | | French scientist Chancourtois organized the elements in a spiral around the cylinder as their atomic weights increase. | 69 |
| 5.Lothar Meyer | | In 1869, German scientist Lothar Meyer arranged known elements with increasing atomic weights and determined the periodic change in their properties, and became the first to draw a table of such a dependence. He identified six groups of similar elements. | 69 |
| 6.Dmitri Mendeleev | | Unlike his predecessors, the great Russian scientist DI Mendeleev made a more complete and perfect periodic table, while organizing the 63 elements known at the time in an increasing atomic order. | 69 |
| 6. Dmitri Mendeleev | | Mendeleyev developed a periodic element system on the basis of Periodic Law. | 71 |
| 6. Dmitri Mendeleev | Periodic System of Chemical Elements | The periodic table of elements is a graphical representation of Periodic Law. So far, about 600 tables, charts, and diagrams representing the Periodic Law have been made. | |
| 7. Ernest Rutherford | Electron Orbitals of Atomic Models | (1871-1937) English physicist. In 1911, his famous experiment on particle scattering proved the existence of a positively charged nucleus in an atom. In 1911, a more efficient atomic model was proposed by British scientist E. Rutherford. | 74 |
| 6. Dmitri Mendeleev | Importance of Periodic Law | Based on Periodic Law, Mendeleyev predicted the physical and chemical properties of the three elements (Sc, Ga, Ge) that had not been discovered at the time and clarified the values of a number of elements. | 94 |
| 6. Dmitri Mendeleev | Atomic Orbitals | Mendeleyev's periodic table of chemical elements relates to the condition of those elements. | 104 |
| | | Mendeleyev's periodic table of chemical elements relates to the condition of those elements. | 113 |

In the unit “The Secret of Events in The Universe” in the Life Sciences textbook, it is stated that an observatory was established on behalf of Nasir al-Din al-Tusi Contributions of Ptolemy and Copernicus to science are briefly given. Copernicus's idea of Earth, Sun movements and planets turning around the Sun is suggested to have turned Ptolemy's thinking upside down. It is observed that the scientific studies of important Turkish-Islamic scientists related to Astronomy are not included in the Life Sciences textbook.

Table 13.
*Scientists in the 8th Grade Life Sciences Textbook*

| Scientist | Unit | Subject | Content | Page |
|---|---|---|---|---|
| 1. Archimedes | | State of Matter | The scientific study on the properties of fluids was initiated by Archimedes about 2230 years ago. | 9 |
| 2. of Nasir al-Din al-Tusi | The Secret of Events in The Universe | | Astro-Physics observatory on behalf of of Nasir al-Din al-Tusi. | 11 |
| 3. Nicolaus Copernicus<br>4.Ptolemy | | | According to Ptolemy's Geocentric System Theory, the Earth is at the center of the universe. The Sun, Moon and planets revolve around the Earth. In the 16th century, Polish scientist N. Copernicus’ solar-centric system theory disrupted Ptolemy's theory. This theory gave people the right idea of the structure of the solar system, and it became clear that all planets revolve around the Sun and the Moon, not revolving around the Earth. | 12 |

## 4. RESULTS, DISCUSSION AND RECOMMENDATIONS

It is understood from the detailed information in the results that the subjects in the science textbooks in Turkey and Azerbaijan have some similarities. Although the number of scientists in the science textbooks in Turkey are not enough, Turkish-Islamic scientists, who made studies on the subjects, are included. The works and inventions of the scientists have been given as an information in the text and in the sections "Text box" and "Do You Know?. In Azerbaijan, science subjects are included in Life Sciences, Technology, Physics, Chemistry and Biology courses. Scientists in the science textbooks in Azerbaijan are also given in

a stream in a text and in the sections "Text box" and "Do You Know?, as in the textbooks in Turkey. The original names of the scientists are given in the science textbooks in Turkey and their Turkish names are given in parenthesis. When the findings have been examined, the names of scientists in all science textbooks in Azerbaijan are observed to be written in Azerbaijani language. It is suggested that scientists' original names can also be mentioned in Azerbaijani science textbooks. In this ways, students do not have any confusion when they see scientists' original names during they study on some platforms such as internet, e-books etc. In addition, nationality of the scientists in the textbook (e.g. British physicist) has been shared before their names. It is seen that there are more Azerbaijani scientists than Turkish-Islamic scientists in the textbooks in Azerbaijan. It has been determined that the scientists included in the science textbooks in both Azerbaijan and Turkey are mostly scientists who have done studies in the 18th, 19th and 20th centuries. Beside these studies of these scientists, more scientists, who have important studies in the 21st century, should be included in the science textbooks. In addition, our Nobel Prize-winner scientist Aziz Sancar, who has done important studies in the scientific world in recent years, Canan Dağdeviren, who has developed a battery-free wearable heart chip and devices for cancer treatment, Feza Gürsey (Theoretical Physics), Gazi Yaşargil (Medicine), Oktay Sinanoğlu (Chemistry) and many more important Turkish scientists can also be included in the textbooks. Turkish-Islamic scientists in the science textbooks in Turkey have been found to be outnumbered those in the science textbooks in Azerbaijan. It is the same for science textbooks in Turkey. It is thought that the works of Azerbaijani scientists, who grew up in Azerbaijani territory and who have made very important contributions to science, should also be included in the textbooks. At the same time, it has been observed that the scientists with important studies in science have recently been included in the textbooks in Turkey. But, it is noteworthy that most of the scientists included in the science textbooks are male scientists for both the two countries. Canan Dağdeviren and her researches are only given in Turkish science textbooks. This may lead students to think that science is done mostly by male scientists. In order to prevent this, it is necessary to include more female scientists in science textbooks.

The scientists in the textbooks both in Turkey and Azerbaijan are briefly issued with their studies, inventions, and short life stories. In addition to this, some words have been usually used both in Turkish and Azerbaijani science textbooks to describe a scientist's contribution to the science. Those are "discover, explain, find, determine, predict, make, set, measure, create. To illustrate this situation two examples can be given from the science textbooks from Turkey and Azerbaijan. It is found that "organize" concept is included in 8th grade Azerbaijan chemistry textbook as "French scientist Chancourtois organized the elements in a spiral around the cylinder as their atomic weights increase." A student can gain limited information when s/he reads this statement. Because as it seen that meaning of the "organized the elements" concept is not so clear if a student has not any idea about this subject. Instead it should be give more detailed information that is related to the subject. The similar situation is also seen in 8th grade Turkish science textbook. Neil Bartlett is given as "He is the first person to synthesize rare gas compounds." In this statement there are two important concepts (rare gas compound and synthesize) which are necessary to be deeply mentioned. It should be given more scientific information while a scientist is given place in a science textbook. If this is not done a student can lose their motivation towards science. Parallel to this claim, Nadeau and Desautels (1984) underlined these give learner naive information about science and scientific knowledge. Their life stories can be given in science textbooks in relation to science and scientific concepts. Clough and Olson (2004) had the similar view and they stated that the significant studies of the scientists were briefly given in science textbooks. Because of this, students may not be able learn scientific knowledge in depth. Çakıcı (2012), investigated four upper primary science textbooks to define the inclusion of four themes of scientific literacy. He revealed that science textbooks only refer to scientist' invention, what was found, and when it was found instead of the historical development of an idea. He also found that the messages about scientists and their inventions seem in the fashion of definition or explanation. Digiuseppe (2014) science textbooks should focus more on nature of science issues effectively. It has been observed that the works and inventions of these scientists and their perspectives in science are not being given in the textbook in a way that will attract students' interests and offer them a career awareness. Conner (2005) wrote in his book that to date, artisans, sailors, those engaging in agriculture and mechanics have contributed to the advancement of science to a great extent. Pellegrino, Peters-Burton and Gallagher (2018), reveals that giving a focus on science curricula by using history of science make students more positive toward science during learning science. Giving more space in textbooks to the Turkish-Islamic scientists and people in various professional groups, who contributed to the advancement of science between the eighth century and the twelfth century, can help students focus on science courses and careers in this field. The Foundation for Science Technology and Civilisation (2010) included, in its work called "the Islamic Heritage in 1001Invention World", very important inventions in human history in basic sciences, Mathematics, Engineering, Social Sciences and other fields. As in this book, more places can be provided to Turkish-Islamic scientists, who pioneered and contributed significantly to the development of science, in science textbooks in Azerbaijan and Turkey. In addition to the studies by Western scientists, the studies by Turkish-Islamic scientists and inventors, who made inventions, can also be included in the science textbooks in both Azerbaijan and Turkey.

Chou (2021) states that science teachers could offer learners to learn science within cultural perspectives by investigating different scientists' studies. In line with this view, I also propose that scientists and their significant studies should be deeply given more place in science textbooks. Thus, I also do not necessarily advocate that only Turkish-Islamic scientists should be included in science textbooks in Turkey and in Turkish speaking countries. This study is limited to science textbooks used in Turkey and Azerbaijan. Therefore, future studies can be carried out by incorporating science textbooks from more countries with similar cultures.

**Research and Publication Ethics Statement**

Author present an accurate account of his study and an objective discussion. His study contains references and refrains from any form of plagiarism which would constitute unethical behavior.

**Contribution Rates of Authors to the Article**

Author of the study conducted whole part of the review paper.

**Statement of Interest**

There is no conflict of interest.

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