International Journal of Environmental & Science Education, 2015, **10**(2), 287-300

History of Science and Medicine in Turkish History Secondary School Textbooks

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•*Received 12 September 2014*
•*Revised 19 December 2014*
•*Accepted 22 February 2015*

In this paper, it is aimed to analyze the acquirements and topics in Turkish secondary school history textbooks that are published by the Ministry of National Education (MEB) and by the private sector to determine to what extend the place given to history of science and history of medicine. In the study, the document and content analysis techniques are used. The documents in this study are Turkish secondary school history textbooks to be taught across the country currently. Elaborates on the history of science and history of medicine acquirements in the textbooks, it can be said that Turkish secondary history textbooks' quantitative coverage of the HOS and HOM topics is 9.7 percent on average. Among the seven secondary school history textbooks, the 10th grade textbook is given the largest space (8.6 percent of the textbook) and again the 11th grade the revolution history of Turkish republic and the principles of Ataturk curriculum is given the smallest space (0.8 percent of the textbook).

Keywords: history of science, history of medicine, history textbooks, history teaching

INTRODUCTION

There has been radical change in our country in secondary school history curriculum and textbooks since 2007. This change has been considered as a big shift from traditional-behaviorist approach to modern-constructivist approach. In Turkey, history curricula and textbooks have been criticized as they mainly concentrated on Turkish national history, which did not give pupils the necessary chances to study local history, European history and world history (Dilek 1999, Dinc 2006, Kabapinar 1998, Kaya et. al. 2001). In new curriculum, again, mainly the place reserved for European and world history is very limited. Second criticism has been that the main focus of the history curriculum was political history (Kabapinar 1998, Ucyigit 1977). Dinc's (2011) study points out that the weight of political history in the new history curriculum is reduced. However, the problems in respect of balancing various dimensions of history and making connections between them in local, national, European and world history contexts in the curriculum content still exist. This situation is also reflected in the textbooks with the same way. It is stated in the secondary history curriculum that "political, social, economic and technological changes

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doi: 10.12973/ijese.2015.246a

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ISSN: 1306-3065

experienced in today's world make the individuals and societies to face with various complex problems, which are also important for the improvement of the history curriculum" (Ministry of National Education 2007, 2011a, 2011c, 2012a, 2012b). Today, technology and science in practice very often go closely together. So, history of science (HOS) and history of medicine (HOM) can help us think through historical alternatives or dead-ends from the past and thus, broaden our horizon with distant alternatives to ultimately successful technologies. However, the question is whether the new history curriculum and textbooks can help to broaden students', especially the students who have non-verbal intelligences, horizon or not.

As Weber (1998) emphasized that generally people are not familiar with HOS as a discipline. He says that "Medicine and science, though accomplished by almost the same means, seem to present lesser problems to their respective historians. But this only seems so. We have to admit that even these disciplines have their problems once nuclear research or molecular biology have achieved such a prominent position. They only underline the fact that they have themselves become technologies, confronting us with the same attitudes as mentioned above. Medicine, just like technology, may in essence be considered a practice developed not only by methods derived from science but even more by technological achievements, social strategies and political hopes."

Humanizing science and medicine through historical vignette will enrich history learning experiences by associating the individual's experiences with the scientific figures'. In addition, inclusion of the HOS and HOM will also provide national and international cultural awareness. In the study that is conducted by Imamoglu and Ceken (2011), it is expressed that not only science and technology lesson, but also social studies lesson is very important to obtain information about the HOS.

THE PURPOSE OF THE PAPER

The aim of this paper to analyze the acquirements and topics in Turkish secondary school history textbooks that are published by the Ministry of National Education (MONE) and by the private sector to determine to what extend the place given to HOS and HOM.

The Statement of the Problem

The following research questions were the focus of this paper. The main research question is stated as:

To what extent are HOS and HOM included in the current Turkish secondary school history textbooks?

In line with this problem is to answer the following research sub-problems:

1. What is the inclusion of HOS topics in secondary school history textbooks?
2. What is the inclusion of HOM topics secondary school in history textbooks?

The Significance of the Paper

When examining the literature, it is observed that there is a lot of work on HOS in curricula and textbooks in primary science and technology (Lacin Simsek 2009, Imamoglu and Ceken 2011; Lacin Simsek 2011, Bulus Kirikkaya 2012), social studies (Lacin Simsek and Simsek, 2010, Imamoglu and Ceken 2011) and secondary math and science (Somuncu et. al. 2012, Cavus and Oztuna Kaplan 2012). There have been a few studies also in history but in USA (Heilbron and Daniel 1988, Shim 2004). However, there has not yet been a study that has examined how the HOS and HOM contents are included in secondary history curricula or textbooks in Turkey. A better

understanding of the role of the HOS and HOM may become apparent by answering the research questions. The discrepancies, which are observed, can be of use to future history curriculum developers and textbook authors regarding the inclusion of the HOS and HOM. The recommendations for including the HOS and HOM in future history textbooks can aid students in their understanding the technological developments around them and widen their future horizons.

Also, the research findings from this paper will help history teachers to develop a better sense of understanding the role of the history science in history learning. The historical, but also scientific approach is considered to be a crucial part of teachers' willingness to modify their instructional paradigm for innovative teaching (Ball and Cohen 1996).

AN OVERVIEW OF METHODOLOGY

This paper is an examination of the HOS and HOM topics in secondary school history textbooks.

In this paper, the qualitative research methods, document analysis techniques were used. Document review includes the analysis of written materials containing information about the target research case or cases. Documents are important sources of information to be used effectively in qualitative research. In this type of research, researcher can obtain the data he/she needs without observation or conversation. In this kind of research, which documents are important and will be used as a data source is closely related to the research problem (Yildirim and Simsek 2008). This paper also observed in depth and details the HOS and HOM contents within secondary school history textbooks by providing an extensive content analysis.

In this paper, six history textbooks are collected and analyzed based on their treatment of the HOS and HOM topics. The examined textbooks are listed in Table1.

Table 1. Examined History Textbooks

Grade	The Title of the Textbook	Year	Publisher
9th	Secondary History 9	2014	MEB
9th	Secondary History 9	2014	BİRYAY
10th	Secondary History 10	2014	MEB
11th	Secondary History 11	2014	MEB
11th	The Revolution History of Turkish Republic and the Principles of Ataturk	2014	MEB
12th	The Contemporary Turkish and World History	2014	MEB

The data collection involved a close examination of sentences, paragraphs, and pages that included information on the topics. This paper first is sought to determine what percentage of the total space in textbook has been devoted to the topics of HOS and HOM. The findings of the secondary school history textbooks are tabulated. In addition, the representative examples chosen from the textbooks are given. While scanning the textbooks with the content analysis technique, the general statements without details (e.g. scientist, profession, development) as "scientific works were done", "it had become a scientific center" and "science activities were carried out" are excluded.

THE FINDINGS

The findings on data obtained from the following textbooks are located.

Findings Related to Textbooks

Currently, six Turkish secondary school textbooks have been taught. Even though there are seven secondary school history curricula, only six textbooks have been taught. It is due to the fact that all the textbooks of the elective curricula are the same. Besides there are two textbooks for 9th grade, one is published by the MONE (2014a) and the other is by private sector (Biryay 2014). Below the findings form the examined history textbooks are tabulated and supported with the some examples from the textbooks.

9th Grade History Textbooks

As seen in the Table2 MONE's book (2014a) for 9th grade textbook includes first HOS topic in Unit2: The birth of civilization and first civilizations under the title about Sumerians (p. 45) and their contribution to science.

Table 2. HOS and HOM topics in 9th grade secondary school history textbooks

Grades	Textbook	HOS		HOM		Total (%)
		(%)	(f)	(%)	(f)	
9th	MONE	7.4	15	3.9	8	7.4
9th	BIRYAY	8.2	21	4.3	10	9.0

The textbook continues with the contribution of Babylonians (p.46) in medicine and astronomy; the developments in the field of medicine, pharmacy, mathematics, geometry and astronomy made by Egyptians (p.50). The 9th grade MONE textbook outlines that the foundation of mathematics and medical science were laid by Ionians (p.57). Even, there is a drama activity about Tales (p.61). Then, it mentions that Greek civilization (p. 61) came to the fore in the fields of history, medicine, arithmetic, geometry, astronomy and philosophy and the thinkers like Sokrates, Platon and Aristoteles. Also there is a comment box about Asklepion Wellness Centre (p. 63) and the developments in the field of medicine occurred there. The textbook then puts emphasis on Islamic and Turkish civilization and scholars in Unit 4: Islamic History and Civilization (to 13th century). On page 123, the medical, natural and astronomical works of Umayyads; on page 127, the mathematical, astronomical, geographical, medical, pharmaceutical works of Abbasids and the foundation of the scientific center "Beytu'l-Hikme"; on page 128, the Islamic and Turkish scholars are mentioned and on page 129 a table about the scholars and their works are presented.



Figure 1. The miniature of Avicenna's pharmacy (p. 128)

In Unit 5: Turkish-Islamic States (10-13th Centuries), the famous scholars of the time Farabi, Biruni and Ibn-i Sina (Avicenna) and the foundation of Nizamiye Madrasah (1066) by Seljuk vizier Nizam al-Mulk in Baghdad are emphasized (p.136). On page 160, the names of Omar Khayyam, Muhammad Bayhaqi, Ebu'l-Muzaffer Isferâyinî, Vasiti, Ahmad Tusi in mathematics and astronomy and their valuable works are referred. Then, Mengujekids scholar Muvaffakuddin Abdullâtif on medicine, physics and philosophy and Artuqids scholar EI-Cezerî on cybernetics are dealt with (p.168). Also in the same unit, The Great Seljuks and Anatolian Seljuks contributions to the scientific world, especially madrasahs and hospitals (darussifa) are mentioned. On page 176, the importance of Chinese inventions such as gunpowder, paper, printing, and the magnetic compass, while emphasizing how they spread to other civilizations via interactions of peoples is emphasized.



Figure 2. The miniature of the peacock hour work of El-Cezeri (p.168).

9th Grade history textbook of Biryay (2014) is mentioned also the scientific developments of Sumerians, Egyptians, Ionians, Greeks, Andalus Ummayyads, Abbasids. In the context of Unit 4: Islamic History and Civilization, Turkish and Islamic scholars are given in detail on page 147,148 and 149.



*4.3. **Resim:** İslam Bilginleri'nin çalışmalarını gösteren temsili resim (1001 İcat Dünyamızda İslam Mirası, s. 49.)*

Figure3. Islamic scholars working (p.147)

On page 163, 164 and 165 the developments in Ghaznavid period, on 181 and 182 in the Great Seljuks, on 189 Danishmends, on 191 Artuqids, The Great Seljuks and Anatolian Seljuks on 205 and 208 are addressed.

10th Grade Secondary School History Textbook

Although there are two curricula as one is compulsory and the other is elective for 10th grade, the same textbook is taught (MONE 2014b).

Table 3. HOS and HOM topics in 10th grade secondary school history textbook

Grade	Textbook	HOS		HOM		Total
		(%)	(f)	(%)	(f)	(%)
10th	MEB	8.6	20	1.7	5	8.6

In 10th grade history textbook (2014b), the topics about HOS and HOM are starting from Unit 2: The World Power: Ottoman Empire (1453-1600). In this unit the developments of science and technology both in European and Ottoman States are presented. On page 56, the science education at madrasah is stated. The importance of the crusades for scientific developments in the West is highlighted on page 58. The scientific developments and the scholars of the Renaissance period are shown country by country in the table on page 61.



Figure 4. The scientific developments during the Renaissance

The scientific and technologic developments in Ottoman State are addressed again in later period. For example, the madrasahs called as Sahniseman, the scholars as Piri Reis, Ali Kuscu, Seydi Ali Reis, Matrakci Nasuh and the most important physician Sabuncuoglu Serafettin (his medical book, his surgical techniques and curing materials) are mentioned in the period of Mehmet the conqueror (pp. 56-57, 79-82).



Figure 5. The miniatures from Sabuncuoglu Serafettin's medical book (p.80)



Figure 6. An activity about the observatories of Takiyyuddin and Tycho (p.81)

On page 82, Ottoman scholars and their European contemporaries are mentioned in an activity table.



Figure 7. Ottoman and the contemporary European scholars (p.82)

In Unit 3: The Years of Quest (17th century), the developments in the field of science and technology in Europe in 17th century are stated. The scholars as Copernicus, Galileo, Bacon, Kepler and their works are mentioned (p.108).

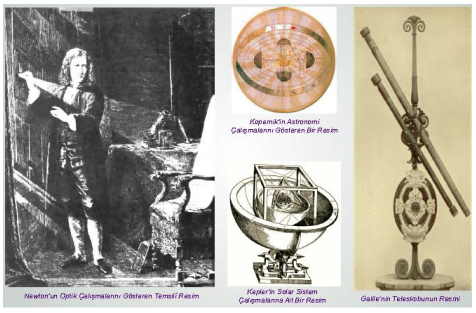


Figure 8. The scientific works of European scholars (p.109)

In the same unit, the culture, science, art and architecture in Ottoman Empire in 17th century are also given especially Lagari Hasan Celebi and his rocket is outlined.



Figure 9. The rocket of Lagari Hasan Celebi (p.118)

The scientific and technologic developments of the Enlightenment and the Industrial Revolution period are given from pages 130 to 134.



Figure 10. The scientific developments in the period of Industrial Revolution (p. 133)

11th Grade History Textbooks

There are two textbooks for 11th grades. One is about Turkish socio-cultural and economic history from the first Turkish states to the Republican era (MONE, 2014c) and other one is about the revolution history of Turkish republic and the principles of Ataturk (MEB 2014d).

Table 4. HOS and HOM topics in 11th Grade History Textbooks

Grades	Textbook	HOS		HOM		Total
		(%)	(f)	(%)	(f)	(%)
11th	MONE	5.3	13	3.8	9	5.3
11th the Revolution History of Turkish Republic and the Principles of Ataturk	MONE	0.8	2	0.4	1	0.8

Most of the HOS and HOM topics in the 11th grade history textbook (2014c) are included in the Unit 5: Education System of Turks. The units of the textbook are organized in a chronological manner from the first Turkish states to the Republican era. This unit runs thirty full pages in the textbooks, which consists of a number of large pictures of old and new means of education, science and technology in Turkish history with introduction of important scholars. The cures of smallpox and eye

diseases, acupuncture treatment and herbalists (Otaci) in Uighur Turks are addressed on pages 173-174. Under the title of The Education of Turkish and Islamic States, Ibn-i Sina (Avicenna) (p.178), the scientific education in Nizamiye Madrasah and darussifas (hospitals) (p. 179), the world map of Katip Celebi (p.180), the cybernetic works of El-Cezeri (p. 181), Ottoman scholars (Takiyuddin, Sabuncuoglu Serafeddin (p. 188), Kadizade Rumi, Piri Reis, Altuncuzade, Seydi Ali Reis (p. 189), Katip Celebi, Lagari Hasan Celebi, Hezarfen Ahmad Celebi (p. 190) and their scientific works are stated.

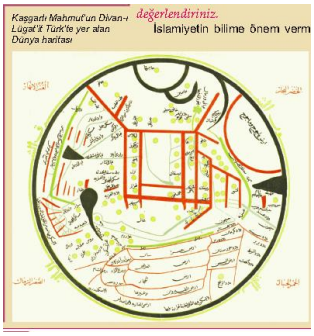


Figure 11. The world map of Katip Celebi (p. 180)

On page 191 a table showing Ottoman scholars, their professions and related works is presented.

12th Grade the Contemporary Turkish and World History Textbook

In 12th grade history textbook (MONE 2014d), the topics about HOS are starting with Albert Einstein and his theory of relativity (p.30). On the same page, the developments in the field of physics (nuclear proton-Rutherford, 1919; positive electron-Anderson, 1931; neutron-Chadwick, 1934; artificial radioactivity- Frederic et Irene, Joliot-Curie and Enrico Fermi; uranium fusion, 1939) and of biology (insulin-Banting and Best 1922; the vaccine of tuberculosis (Bacillus Calmette–Guérin/BCG)-Calmette and Guerin, 1921; penicillin-Alexander Fleming, 1928) are mentioned.

On page 191 a table showing Ottoman scholars, their professions and related works is presented.

OSMANLI DEVLETİ'NDE BİLİM İNSANLARI VE ÇALIŞMALARI

Yy.	Bilim İnsanları	Alanı	Eserleri	Bilim İnsanları	Alanı	Eserleri
XIV ve XV. yy.	Şeyh Edebâli	Dinî		Oruç Beg	Tarih	
	Aşıkpaşazâde	Tarih	Tevarih-i Âl-i Osman	Kaşifî	Tarih	Gazaname-i Rum
	Hacı Paşa	Tıp	Müntehâb-i Şifa	Enverî	Tarih	
	Şair Ahmedî	Tıp, Tarih	Tervihu'l-Ervah	Tursun Bey	Tarih	
	Mukbilzade Mümin	Tıp	Zahîre-i Murâdiye	Beişti Sinan Çelebi		Tevarih-i Âl-i Osman
XVI. yy.	Takiyüddin Mehmet	Astronomi		İdris-i Bitlisi		Heşt Behişt
	Molla Lütfi	Astronomi	Mevzuâtü'l Ulûm	Ahi Ahmet Çelebi	Tıp	Risâle fi't-Tıp
	Muslihiddin Bin Sinan	Astronomi	Risâle-i Eflâtuniyye	Kemal Paşazade	Tarih	
	Altuncuzade	Tıp		Neşri Mehmet Efendi	Tarih	Cihan-nüma
XVII. yy.	Kâtip Çelebi	Coğrafya, Tarih	Cihannüma	San Abdullah Efendi	Dinî	Cevahir-i Bavahir-i Mesnevi
	Naima		Tarih-i Naima	İbrahim Peçevi	Tarih	
	Hibri Ali Efendi	Fıkıh	Hadikat'il Fukaha	Müneccimbaşı	Tarih	Sahayifül-Ahbar
	Müneccimbaşı Ahmet Dede	Tarih	Sahaif'ül Ahbar (Câmiü'd-Düvel)	Hazerfen Hüseyin Efendi	Hukuk	Telhisü'l-Beyan fi Kavanin-i Âl-i Osman
XVIII. yy.	Ayaşlı Şifaî	Tıp				
XIX ve XX. yy.	Mehmet Fatin Gökmen	Astronomi				

Figure 12. Ottoman scholars, their disciplines and related works (p.191)

The Revolution History of Turkish Republic and the Principles of Ataturk Textbook for 11th grade, there is one topic about HOS and is one topic about HOM.

The HOS topic is the University Reform in 1933 (p. 86) and the HOM topic is the Revolutions about health (p.98).

Table 5. HOS and HOM topics in 12th Grade History Textbook

Grade	Textbook	HOS		HOM		Total
		(%)	(f)	(%)	(f)	(%)
12th	MONE	6.1	15	1.6	4	6.1



Tabloda iki savaş arası döneme ait icat ve keşiflerin bir kısmı verilmiştir. Sizler de bu dönemdeki diğer icat ve keşifleri araştırarak tabloya ekleyiniz.

Yıl	İcat, keşif	Ülke
1920	ABD'de ilk radyo yayınının yapılması	ABD
1921	Verem aşısının geliştirilmesi	Fransa
1923	Elektrikli trafik ışıklarının geliştirilmesi	ABD
1924	Dondurulmuş yiyeceklerin üretilmesi	
1925	Elektrikli ses kayıt aygıtlarının geliştirilmesi	
1926	İlk başarılı roket denemesi	
1927	İlk sesli sinema filminin yapılması	
1928	C vitamininin keşfedilmesi	
1929	Penisilinin bulunması	
1932	Nötronun bulunması	
	Elektron mikroskobunun geliştirilmesi	
1935	Radarın geliştirilmesi	
1938	Çekirdek bölünmesi (fizyon)	

Figure 13. An activity about the inventions and explorations of the interwar period (p.31)

In the Unit2: The Second World War; war technology, especially the atomic bomb is addressed.



Figure 14.
The atomic bomb (p.66)



Soğuk Savaş Döneminde devletler arasındaki rekabet uzaya taşınmıştır.

Figure 15.
The space rocket (p.79)

The space technologies and the interstate competition during the cold war period is emphasized in Unit3: The Cold War Period (p. 79). Also the automotive (p.112), computer (p.113) and biological (DNA) technology (pp.114-115) are also stated.

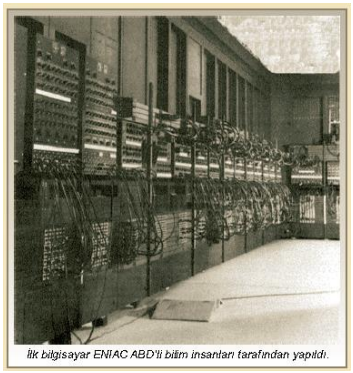


Figure 16.
The first computer (p.113)

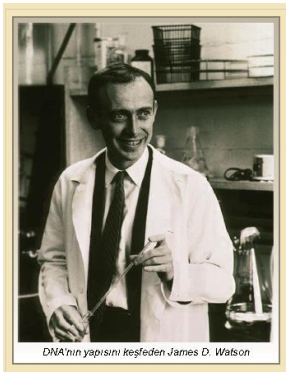


Figure 17.
James D. Watson:
The discoverer of DNA (p.114)

The communication and satellite technology, especially the foundation of the World Wide Web is mentioned in Unit4: The Détente Period and after (p.145).



Figure 18. Neil Armstrong and Sputnik Satellite (p.145)

Yıl	İcat-gelişme	Ülke
1961	İlk insanlı uzay uçuşu (Yuri Gagarin)	SSCB
1962	İlk haberleşme uydusu (Telstar1)	
	İlk sınaî robot	
1963	Yer eksenli haberleşme uydusu	
1965	İlk uzay yürüyüşü (Alexy Leonev)	
	Hawker Harrier (dik havalanabilen ilk uçak)	
	İlk kalp nakli (Chirstian Barnard tarafından)	
1968	Ay etrafında ilk pilotlu uçuş	
1969	İnsanoğlu aya indi (Neil Armstrong-Edwin Aldrin)	
1971	Mikro işlemci (İntel Firması)	
1972	Video kaset	
	İlk video disk	
1973	Mini bilgisayar	
1974	Hafıza kartı	
1975	Hepatit B aşısı	
1976	Cray1 işlemci (250 milyon/sn)	
1977	Nötron bombası	
1978	Nükleer manyetik rezonans (İlk tıbbi görüntüleme [MR])	
1979	Compact disk (CD)	
	PC ev bilgisayarı	

Memo Larousse, c. 3 (Keşifler ve İcatlar), s. 904-906

Figure 19. The activity about the developments of the Cold War era (p.146)

In the Unit5: The Globalizing World, the nuclear competition, nanotechnology and cloning technology are presented (p.174, 203, 204, 205).



Figure 20. Nanotechnology



Figure 21. The cloned sheep Dolly (p.204)

Finally, in the same unit, under the title of "The Global Problems", gene technology and the abuse of it is given with the examples and graphs (p.230).

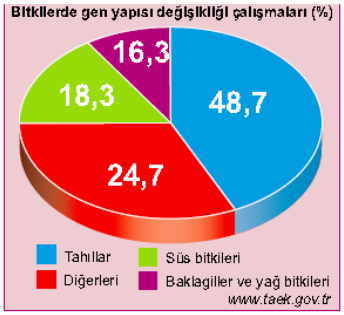


Figure 22. The plant gene change studies (p.230)

RESULTS AND DISCUSSION

The purpose of this paper is to examine the all current secondary school history textbooks for their inclusion of the HOS and HOM contents.

Turkish secondary history textbooks' quantitative coverage of the HOS and HOM topics is 9.7 percent on average. Among the seven secondary school history textbooks, the 10th grade textbook is given the largest space (8.6 percent of the textbook) and again the 11th grade the revolution history of Turkish republic and the principles of Ataturk curriculum is given the smallest space (0.8 percent of the textbook).

When the styles of presenting the HOS and HOM elements were examined, all six textbooks revealed a pattern usually including the scientists' names and giving short introductions about them. However, little sense of the scientists' actual lives is discussed. There are also hardly any discussions about the religious or political atmosphere in society that cause the new paradigms of science. In particular, the most of the influential progress of the last century that is named as "information", "nano" and "space" era has not taken place; even if it has, it has not been examined thoroughly. As a result, current secondary school history textbooks have an encyclopedic "look and feel" to them which does not allow enough room for facilitating HOS and HOM.

Considering the fact that the interactions between science and society became closer and more intertwined during the last decades, the researcher found that the Turkish history curricula and textbooks investigated in this paper neither appropriately responded to the needs of society and to the main goal of history education which is learning about history to understand the present and shape the

future, nor fully portrayed the historical process in which the current information era and technological world came to be shaped while allocating much less space to HOS and HOM content than what they substantially and quantitatively are assumed to merit.

Particularly, when the lack of students' interest in history lesson is taken into account (Safran, 1993); students see the history lesson to be among the least useful subjects in relation to their present and future needs. If all students are given more opportunities to critically examine the past developments of science and technology and the relationship between science and society in the past, this could help students to predict and prepare for the future needs and the concerns of the complex science-society interrelated situations. In fact even now, the real-world problems require citizens to integrate the HOS and HOM content with different subject areas. However, the inclusion of HOS content within curriculum has been opposed from primarily two sides: from historians who see history in science lessons as poor history and from scientists who see it as taking up valuable time that could be spent "learning" science content (Matthews, 1994).

RECOMMENDATIONS

Textbook authors should seek the recommendations of historians of science as well as subject-matter specialists (biology, physics, chemistry, medicine) and teachers in determining the appropriate content for the secondary school history textbooks. This approach would aid in constructing a smooth and accurate historical treatment of HOS and HOM topics in history textbooks. History teacher education programs should utilize the HOS and HOM instruction as part of their curriculum.

Also, the elements of history curricula should include presenting students a historical approach to science as an avenue of creating student awareness of science as a cultural heritage. By examining the HOS and HOM topics, history humanizes the subject matter of science, making it less abstract and more engaging.

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