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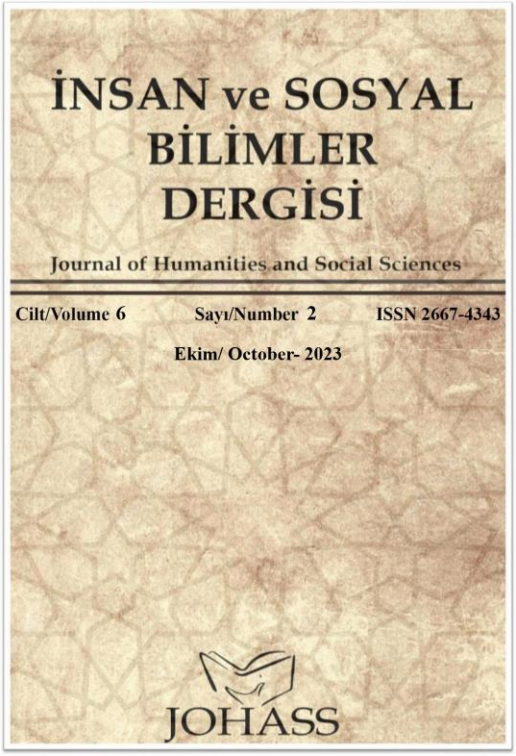

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How Was the Science Literacy Demonstrated in Primary Science Textbooks in Early Republican Türkiye?

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Abstract

In this research, the investigation aimed to determine whether there was a balanced distribution among the science literacy dimensions in science textbooks and whether these textbooks could prepare scientifically literate citizens in the early Turkish Republic (1926-1948). Additionally, the research sought to compare the distribution of science literacy in the textbooks of that period with those of the present day. The research used the content analysis method to examine three textbooks for the 4th and 5th grades, prepared according to the 1926 and 1936 curricula. Among the books examined, a balance is seen in the dimensions of science literacy only in the object textbook prepared according to the 1926 program. The fact that most of the content in the books related to the 1936 program is in the dimension of science as knowledge shows that there is no balance in the dimensions of science literacy. The dimension of science as a way of thinking is the least seen dimension in the textbooks examined. In general, it has been concluded that science literacy has yet to be balanced since the 1936 curriculum. This situation coincides with current research.

Keywords: History of education, science education, science literacy, textbooks, science

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Introduction

In today's rapidly advancing world, achieving and continually honing one's science literacy (SL) skills is paramount. Proficiency in these skills not only enables individuals to comprehend and scrutinise complex scientific data effectively but also facilitates meaningful discussions on science-related topics. This competence extends to understanding evidence-based information sources, vital for navigating fields like technology, healthcare, and broader societal issues. Moreover, cultivating a society of critical thinkers enriched with these skills fosters a deeper appreciation for evidence-based approaches to address global challenges (Sadler & Zeidler, 2004; Wang et al., 2023). The primary objective of today's education system is to offer robust educational opportunities, equipping future generations with the capacity for systematic, research-driven decision-making and ultimately steering our world toward an ethical and equitable transformation guided by the principles of science and technology. In pursuing this goal, SL plays a pivotal and indispensable role.

SL is specifically essential in science education as it plays a crucial role in achieving science education reform goals and enhancing students' understanding and engagement in scientific practices (DeBoer, 2000). SL entails the ability to critically comprehend and evaluate scientific information, as well as the proficiency to apply scientific knowledge and skills in practical, real-world scenarios. Within science education, a vital component of SL revolves around nurturing the skills of scientific reasoning and argumentation in students. It is imperative that students scrutinise and assess scientific evidence, construct cogent and well-founded arguments, and actively participate in scientific discourse (Christenson et al., 2011). Through the cultivation of SL, science education empowers students to actively engage in scientific processes and make judicious decisions grounded in empirical evidence. Additionally, SL in science education is intricately connected to grasping scientific advancements' societal and ethical ramifications. Students must develop an awareness of the influence of science on society, encompassing matters pertinent to genetics, the environment, and technology (Kampourakis et al., 2013). This comprehension empowers students to systematically assess the advantages and drawbacks of scientific progress, facilitating well-informed decisions that consider the broader societal milieu. Moreover, incorporating SL within science education augments students' perception and involvement in scientific subjects. The way teachers perceive integrated science education and SL carries significant weight in shaping students' encounters and attitudes towards the field of science (Rubini et al., 2019).

By integrating SL into the curriculum, educators can assist students in recognising the pertinence and utility of scientific knowledge in their everyday lives and prospective careers.

Framework of Science Literacy (SL) and Science Curriculum

Curricula are the product of their time and reflect the characteristics of the age (Kantekin & İrez, 2021). In this context, in contemporary societies, educational institutions and programs mediate raising the type of people needed by age (Arslan et al., 2014). The Ministry of National Education (MoNE, 2018, p. 9) emphasises that The Science Curriculum aims to make all individuals SL. A given definition of SL is:

> A combination of science-related skills, attitudes, values, understandings and knowledge necessary for individuals to develop research-inquiry, critical thinking, problem-solving and decision-making skills, to become lifelong learners, and to maintain a sense of curiosity about their environment and the World. (MoNE, 2005, p. 5)

In line with the definition of SL, it has been a matter of curiosity about how students will acquire SL in the curriculum. In this context, studies have emerged to investigate how SL is included in the curriculum, in textbooks, course activities and course contents, which reflect the curriculum. Research began in 2004 and has continued until today, with a significant increase by 2012 (Kılıçaslan & Dökme, 2022).

Kılıç, Haymana and Bozyılmaz (2008) analysed the 2004 Science Curriculum with respect to aspects of SL and science process skills. According to the results, there was no balance among the four dimensions of SL. Cakici (2012) investigated the four upper primary level science textbooks (4th and 5th grades) were analysed to determine the inclusion of four dimensions of SL. Cakici's study reveals an imbalanced coverage of SL dimensions in Turkish science textbooks. Candaş (2019) tried to find out if Turkish 5th, 6th, 7th and 8th-grade science textbooks provide a balance of SL dimensions. The results revealed that the science textbooks at all grades provided an unbalanced distribution of SL dimensions. In their 2021 study, Kantekin and İrez sought to determine whether Turkish high school physics, chemistry, and biology curricula maintain a balanced representation of SL dimensions. Results revealed that all three curricula at all grades provided an unbalanced distribution of SL dimensions. The study of Kılıçaslan and Dökme (2022), which is a field survey study, has the objective of specifying the current situation by compiling the research and putting forward suggestions regarding the deficiencies of SL in Türkiye. In the studies on SL in curriculum

and instructional materials, it was reported that the curriculum emphasised the dimensions of the nature of science and key science concepts more and the dimension of science-technology-society-environment interaction less.

Research conducted in Türkiye in the last 20 years shows that Science Curriculum and textbooks do not have a balanced structure of SL. Remembering the crucial role of SL in science education, the need to examine whether the units included in science textbooks provide students with opportunities to develop these abilities holds a strong argument (Sideri & Skoumios, 2021).

The purpose of this study is to investigate the balance of scientific literacy dimensions in the early period of the Republic of Türkiye (1926-1948) science textbooks used in science education in an attempt to find out whether or not these textbooks have the potential to prepare scientifically literate citizens and the continuity between past and present. Given that schools, curricula, and textbooks constituted the primary means of reaching students during that era, the textbooks used in our research can provide insight into the approach to SL within science education. When considered alongside contemporary studies in the field, this analysis can offer valuable insights into the progression of SL in science education in Türkiye, spanning from the past to the present. In light of these objectives, the study aims to address the following inquiries:

1. Was there a balanced distribution among the SL dimensions in science textbooks in the early Turkish Republic?
2. Did science textbooks have the potential to prepare scientifically literate citizens in the early Turkish Republic, and is there continuity with the present in this sense?

Method

Research Design

The study utilised the content analysis method, which enables researchers to aggregate akin data based on specific concepts and the reduction of phenomena or events into defined categories to better analyse and interpret them (Harwood & Garry, 2003; Neuendorf, 2017). This approach is commonly employed in evaluating educational materials like school textbooks, enabling researchers to derive insights through systematically classifying or coding textual content (Krippendorff, 2013).

Framework to Analysis

In the analysis, the framework developed by Chiappetta et al. (1993), which addresses SL under four dimensions and is finalised with the contribution of various researchers (Chiappetta et al., 2006), was used. Four dimensions of SL are (1) science as a body of knowledge (SBoK), (2) science as a way of investigating (SWoI), (3) science as a way of thinking (SWoT), and (4) the interaction among science, technology, and society (STS). These aspects of SL were used to investigate the balance of SL dimensions in science textbooks used in the Republic of Türkiye.

1. SBoK: This dimension includes principles, facts, concepts, hypotheses, laws, theories and science models necessary for a scientifically literate individual (Boujaoude, 2002; Chiapetta et al., 1991; Cakici, 2012).

2. SWoI: Within the scope of this dimension, using methods and processes of science such as measuring, observation, classifying, inferring, recording, data analysing, communicating, making calculations, using formulas and experimenting skills are expected (Boujaoude, 2002; Chiapetta et al., 1991; Cakici, 2012).

3. SWoT: Science as a way of thinking: This dimension emphasises reasoning, thinking, and reflection in the construction of scientific knowledge and the work of scientists (Boujaoude, 2002; Chiapetta et al., 1991; Cakici, 2012).

4. STS: This dimension consists of understanding the impact of science on society and the inter-relationships between science, society, and technology.

Following the procedures portrayed by Chiapetta et al. (1993), every unit of examination in this study was relegated to a unique dimension in light of the most grounded accentuation given to that unit. For instance, a few units of analyses began with 1st dimension as SBoK, going on with an accentuation on the 2nd dimension as SWoI. In this case, the unit was assigned to 2nd dimension.

In the examination of several units comprising of simply questions or finishing up with an inquiry were classified as dimension 1 due to the way that there were answers not long previously or after the inquiry in the text. It would not lead students to reasoning or investigating.

The analysis and categorisation were performed on the following components of the science books: complete paragraphs, figures-pictures-tables with captions or short statements, marginal comments or definitions, questions and each complete step of a laboratory or hands-on activities. Goal or objective statements, title pages, titles in the units, bibliography,

prefaces, glossary and vocabulary lists excluded during analysis. A total of 1247 units were analysed, 259 of which were included in the textbook of the 4th-grade nature (tabiat), whereas 333 were in the textbook of the 5th-grade nature (tabiat) and 555 in the 5th-grade object (eşya).

Reliability

In the data analysis, the two researchers coded the first unit in the 5th-grade nature (tabiat) textbook together. At this stage, the aim was to minimise the differences between the researchers by developing a common understanding. In the decision-making process, the statement was read, and it was decided which dimension of SL it aimed to develop in students. The units were then analysed independently by two researchers (coders). As a result of the independent analysis, the Cohen Kappa coefficient was calculated to determine the reliability between the coders, and it was determined as 0.81.

Framework to Textbook Selections

This study investigates science textbooks used in Türkiye between 1926 and 1948. To provide a holistic understanding of the science education of that time, the analysis centred on the 5th-grade object (eşya) textbook, aligned with the 1926 primary school curriculum, and the 4th and 5th-grade nature (tabiat) textbooks, which followed the 1936 primary school curriculum. The 1926 primary school curriculum is one of the most comprehensive curricula developed following the establishment of the Republic of Türkiye. Under this curriculum, the science course for 4th and 5th graders is divided into two distinct lessons: object (eşya) and nature (tabiat), with each lesson receiving two hours of instruction per week. Following the 1926 curriculum, a new primary school curriculum was prepared in 1936. This curriculum was introduced during the 1936-1937 academic year and remained until the 1948-1949 academic year. Under the 1936 primary school curriculum, the object (eşya) lesson was eliminated, and all subjects were combined into the nature (tabiat) lesson, which was taught for three hours per week. While the 1926 program leaned toward a more liberal approach, the 1936 program adopted a more authoritarian stance. Under the 1926 curriculum, textbooks were chosen from various authors' books as long as they aligned with the curriculum's guidelines. However, in 1936, a new practice was introduced where the state selected authors to write the textbooks. Consequently, the influence of the prevailing ideology and scientific views of the time became more evident in textbooks after 1936. Hence, in this study,

textbooks aligned with both the 1926 and 1936 curricula were selected to examine the impact of these differing approaches.

Table 1 presents the imprint and content information of the selected books. Naime Halit's 5th-grade object (eşya) textbook, which was designed following the 1926 curriculum, remained in use until the adoption of the new curriculum in 1936. Following the 1936 curriculum change, nature (tabiat) textbooks authored by Tarık Emin Bilgen and Suphi Rıza Doğukan were introduced. The activities included in these science textbooks for primary school grades of 4th and 5th constituted the study's sample. The reason for choosing these grade levels is that students are introduced to science more regularly and systematically in these grades.

Table 1

The Imprint and Content Information of the Selected Books

	4th grade nature (tabiat)	**5th grade nature (tabiat)**	**5th grade object (eşya)**
Author	Tarik Emin Bilgen & Suphi Riza Doğukan	Tarik Emin Bilgen & Suphi Riza Doğukan	Naime Halit
Date of publication	1937	1936	1936
Publisher	Ministry of culture of the republic of Türkiye	Ministry of culture of the republic of Türkiye	Ministry of culture of the republic of Türkiye
Place of publication	Istanbul	Istanbul	Istanbul
Page number	161	160	160

Findings

Table 2 presents coverage of the four dimensions of SL in grade 4 and 5th-grade science textbooks for the units. A total of 1247 units as complete paragraphs, figures-pictures-tables with captions or short statements, marginal comments or definitions, questions and each complete step of a laboratory or hands-on activities in science books were analysed. In the early republican period of Türkiye, science textbooks appear to devote the most coverage to dimension 1 as SBoK. As shown in Table 2, about half of the units (51%) analysed are in the dimension of SBoK.

Table 2

The Distribution of the Dimensions of SL.

Dimensions of Scientific Literacy							
SBoK		SWoI		SWoT		STS	
f	%	f	%	f	%	f	%
635	51	247	20	140	11	225	18

Table 2 shows the distribution of the dimensions of SL in the science textbooks used in the 4th and 5th grades of primary education in the early period of the Turkish Republic. In these textbooks, it is seen that SBoK is the most common dimension of SL, while SWoT is the least common dimension. The distribution of the 2nd and 4th dimensions is similar to each other. It is seen that there is a similarity with other studies in the literature. The conclusion that SBoK is the most frequently identified SL dimension in science textbooks is supported. It can be stated that a balanced education in terms of SL was not demonstrated in science education at the primary level in the early republican period.

Table 3

The Scientific Literacy Dimensions According to Book Type

SL Dimensions	4th Grade Nature		5th Grade Nature		5th Grade Object	
	f	%	f	%	f	%
SBoK	228	64	198	59	209	38
SWoI	50	14	63	19	134	24
SWoT	18	5	27	8	95	17
STS	63	17	45	14	117	21
Total	359	100	333	100	555	100

One of the study's essential findings emerges when the textbooks are analysed according to their type. Table 3 presents the results of analysing these three books regarding SL. When Table 3 is examined, it is seen that the SL dimensions in the 5th-grade object textbook show a more normal distribution than the other textbooks. It can be said that the most significant difference is in the transition from the SBoK dimension to the different dimensions. While this dimension is 64% and 59% in the 4th and 5th-grade nature textbooks, it is 38% in the 5th-grade objects textbook.

Similar studies in the literature state that the most intensive SL dimension in both textbooks and curricula is SBoK. Cakici (2012) examined science textbooks used in 4th and 5th grades in terms of SL and found that this dimension was between 42% and 47%, while

Candaş (2019) found that the frequency of this dimension in 5th-grade science textbooks was around 66%. In this study, it is seen that this rate is 51% in the general evaluation. On the other hand, it is revealed that this rate decreased to 38% in the 5th-grade objects textbook. As this decrease is reflected in the increase in other dimensions, the 5th-grade objects textbook demonstrates more balanced structure.

SWoI dimension is more common in the 5th-grade objects textbook (24%) than in the 4th-grade nature textbook (14%) and the 5th-grade nature textbook (19%). While scientific knowledge such as concepts, facts, theories and hypotheses are presented with direct explanations in nature courses where biology, health, and nature subjects are predominant, scientific knowledge is presented with scientific processes such as experiments and observations in objects courses where physics and chemistry are predominant. The reason for this may be related to the educational philosophy of the 1926 curriculum and the content of the courses. This curriculum aims to enable students to work in groups, learn by doing and experiencing, make inquiries, engage in mental activities and relate what they learn to daily life (Akdağ &, Çiydem, 2021; Ulubey & Aykaç, 2017). It can be seen that the emphasis in teaching physics and chemistry subjects is more on applied science in the objects textbook. It was determined that each topic had at least one experiment or observation. In addition, it is noteworthy that many questions are based on high inquiry in the textbooks. For example, questions asked to students in the textbook on gravity and buoyancy are as follows;

> You know that the earth has a north pole and a south pole. Let's say we drill a hole from the North Pole to the South Pole to pass through the earth's centre. Now, let's throw a stone from the North Pole and a stone from the South Pole. How far will these stones fall? (Naime Halit, 1936, p. 12)
>
> A water buffalo or a dog that enters the water can swim with no difficulty, just by moving its feet. Let's throw one of the quadruped animals that are not used to such water, for example, a cat, into the water. Although this animal shows signs of alarm, it still swims quite quickly and comes to the edge. Mice are also good swimmers. Humans, on the other hand, if they do not know how to swim, they immediately sink and drown when they fall into the water. What is the reason for this? (Naime Halit, 1936, p. 101)

SWoT is the least common dimension in all three textbooks analysed. While this dimension remained at low rates of 5% in 4th grade and 8% in 5th grade in the nature textbooks, it increased to 17% in the objects textbook. These findings related to SWoT show

that 4th and 5th-grade science textbooks do not offer Turkish students a balanced perspective on SL. Lots of studies on the subject in the literature emphasised that the dimension of SWoT is not sufficiently included in textbooks and curricula (Cakici, 2012; Candaş, 2019; Kantekin & İrez, 2021). In the textbooks examined, it was possible to see sentences attributing the dimension of SWoT.

> The most brilliant example of this is seen in the Suleymaniye Mosque, the highest work of Turkish architecture, built by Mimar Sinan. In this mosque, there is a barred place around the dome. If you go up there and hold your watch, your friend standing in front of the wall on the opposite side will hear it very well. The return of sound in this way is called echo. (Naime Halit, 1936, p. 93)
>
> The gramophone, invented by Edison, was created with the idea of sound being transmitted through air. (Naime Halit, 1936, p. 93)

The interaction among STS dimension is 17% and 14% in the 4th and 5th grade nature books and 21% in the 5th grade object book. This dimension is more balanced among the books analysed than the other dimensions. The 1926 primary school curriculum aims to educate children about modernisation, a thrifty economic life and a healthy life (Tuğluoğlu & Tunç, 2010). Many examples of the social and modernisation issues aimed by the curriculum were encountered in the textbooks examined.

> The twentieth century is an era in which science and society have reached a point they have not reached since the world began. Europe and America are competing to go further in this progress. One of the most significant duties of every Turkish child is to work with all his/her might to not fall behind Europeans and Americans in this progress. Tomorrow, great openers and inventors will emerge among you, and on that day, our beloved Türkiye, the most beautiful country in the world, will have attained true happiness. (Naime Halit, 1936, p. 160)
>
> As socialization progresses, people's needs increase. A hundred years ago, people lit their rooms with kindling, candles, and other things; today, they are looking for electric lamps. Horse-drawn trams are a thing of the past; electric trams run everywhere. Where we used to send letters a hundred years ago in six months, today, we can send news by telegraph in five or six minutes. We can listen to what people in places days away from us are talking about, what concerts they are giving, and what theatres they are playing by wireless telephone (i.e. radio). (Naime Halit, 1936, p. 136)

Another reason may be due to the pragmatic principles in the 1926 curriculum. This curriculum requires that information be given with examples from the environments in which students live, encouraging learning by doing and experiencing. In fact, the principle of "close place" in the 1936 program, especially the principle of students learning in the context of their environments, is more dominant. "Close place" principle, the topics to be covered in the courses will always be given in the context of their relationship with people. In other words, according to the 1936 program, all subjects related to physics, chemistry and biology will be covered in a way that focuses on society and people. As in the examples given in the curriculum, the student is first taught about the animals and objects in his environment and related to his general life, or the student is made to feel more interest and curiosity in the objects they use every day (İlkokul Programı, 1936, pp. 111-113). However, the STS principle dominates the 1926 textbook, not the 1936 textbooks. It can be said that this dominance in the 1926 program was an effect of the reform movements initiated by Atatürk, modernization policies, and the integration of science and technology. It is possible to find the following vital elements in terms of STS in the textbook prepared according to the 1926 curriculum analysed.

> X-ray machines, which play the most important role in medicine, work with electricity. Electric stoves, ovens and irons are unmatched by any other means in terms of cleanliness and convenience. In short, electricity is the arm and the wing of the sociality; electricity, which plays such an important role in industry and in all our lives, is not visible to the eye like any other force of nature, but is understood by its works. (Naime Halit, 1936, p. 137)
>
> Today, the radio of telegraphy, that is, wireless telegraphy, has also been invented; it is impossible for a steamer in the middle of the sea to talk to the shore by wire telegraphy. However, it is possible to talk with wireless telegraphy. Today, on ferries traveling between Europe and America, daily newspapers are published as a result of wireless telegraphy. (Naime Halit, 1936, p. 151)

Disscusion and Results

This study investigated whether there was a balanced distribution among the SL dimensions in science textbooks, whether science textbooks could potentially prepare scientifically literate citizens in the early Turkish Republic, and whether there is continuity

with the present in this sense. Since the analysed textbooks were used as the only source for a long time in the early republican period, it can be thought that they can reflect how SL was handled in science education. When evaluated with current studies in the literature, it can provide essential clues in revealing the status of SL in Türkiye from the past to the present. Remembering SL's crucial role in science education, the need to examine whether the units included in science textbooks provide students with opportunities to develop these abilities holds a strong argument (Sideri & Skoumios, 2021).

According to the results, it is seen that SL was not balanced in the early period of Türkiye. The common point in analysing three primary science textbooks is that the dimension of SBoK is the most intensive. The fact that more than half of the analysed content is in the dimension of SBoK indicates that this balance is not formed because it shifts towards that dimension. Similar results are also found in studies examining contemporary Türkiye's 4th and 5th-grade science textbooks regarding SL. Cakici (2012) found that SBoK dimension was between 42% and 47.2% in 4th and 5th-grade science textbooks, and Candaş (2019) found that it was 66.2% in 5th-grade science textbooks. In the studies examining SL in secondary school textbooks (Kantekin & İrez, 2021), evaluating SL in terms of curriculum (Cansız & Türker, 2011; Erdoğan & Köseoğlu, 2012; Kılıç et al., 2010), and review (Kılınçaslan & Dökme, 2022), it is emphasised that there is an intensity in SBoK dimension. It shows that science education has remained at the level of conceptual teaching in the past and today. In sum, the SBoK dimension is predominantly present in all textbooks analyzed. It means that scientific process skills, the nature of science and science society technology interaction are not emphasized sufficiently.

The dimension of SWoT is the least common (11%) in the textbooks analysed. This result is in line with many national and international studies. Cakici (2012) emphasises in his study that the dimension of SWoT is almost non-existent in 4th and 5th-grade science books. Candas (2019) concluded that the dimension SWoT was the least common SL dimension in 5th, 6th, 7th and 8th-grade science textbooks, with an average of 2.84%. In fact, when compared to current research, it is seen that the representation of SWoT has decreased over time. Although SL is stated as the vision of many primary science curricula in Türkiye and worldwide, old current and textbooks devote very little space to SWoT and thus ignore an essential dimension of SL. This study reveals that for nearly a hundred years in Türkiye, a traditional approach to science education has been maintained in which scientific knowledge is taught intensively, and the inquiry is ignored.

Individuals must be scientifically and technologically equipped to keep up with today's technological age. For this reason, the scientific understanding of the individual is also essential for society. In a current study, Candas (2019) concluded that the STS dimension in science textbooks appears between 2.8% and 9.1%, with an average rate of 4.96%. In their literature review on SL, Kılınçaslan and Dökme (2022) mention that the STS dimension is the least emphasised dimension in the results of related studies. In the textbooks analysed in this study, insufficiency is observed in terms of the STS dimension. Compared to current science textbooks, the STS dimension in the early Republican period is noticeable. Considering that access to information and technology was not as easy a hundred years ago as it is today, it can be assumed that the STS dimension has been adequately addressed. In fact, at that time, the principle of close place was intended to enable students to transfer the knowledge they had acquired in lessons and textbooks to the society. Today, adding engineering and design skills to the updated program can be seen as an important breakthrough to close the gap in the STS dimension.

On the other hand, the 5th-grade object book, which belongs to the 1926 curriculum, can be considered as a promising product. The curriculum, which adopts the pragmatic educational philosophy, aims to enable students to work in groups, learn by doing and experiencing, make inquiries, engage in mental activities, relate what they learn to daily life, and be aware of modernisation, economy and healthy life (Akdağ & Çiydem, 2021; Tuğluoğlu & Tunç, 2010; Ulubey & Aykaç, 2017). Considering that the purpose of the curriculum overlaps with SL, it can be understood how the 5th-grade textbook, which is prepared in line with the curriculum, shows a more balanced distribution in SL. Altınok and Tunç (2013) also found that the 1926 science curriculum was rich in scientific process skills, consistent with the results obtained from the 5th-grade object textbook. The textbook gives the impression that the 1926 science curriculum had the potential to prepare scientifically literate citizens, considering that SL was not well known in the past.

Although the 5th-grade object textbook has a more balanced structure and strengths regarding SL, it does not change the general framework. Hence, it can be concluded that science education in early republican Türkiye was inadequate in preparing scientifically literate individuals. The fact that SL has gained popularity since the 1950s can be seen as a reason why SL is not balanced enough in these science textbooks. Based on current research on SL, educational reforms over time have not moved science education and SL forward. At

this point, it must be questioned why SL has not been balanced in science education, textbooks and curricula since the beginning of the Republic.

Recommendations

- It is recommended that textbooks and instructional materials should be published with the support of scientists after being analysed in terms of SL dimensions. In particular, the authors of textbooks should be chosen from among people with adequate knowledge of SL.
- This study analysed 4th and 5th-grade science textbooks at the primary education level in the early republican period. Conducting studies at the secondary education level for the same perid will provide a more comprehensive framework for the state of SL.
- Examining the teacher's guidebooks and auxiliary books in early Republican Türkiye used in addition to these sources may provide a different perspective.

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