African Educational Research Journal
Vol. 13(2), pp. 245-257, June 2025
ISSN: 2354-2160
Full Length Research Paper

Examination of the secondary school science curriculum in Türkiye in terms of balance principle

Gürbüz Ocak[1], Burak Olur[2]* and Mustafa Enes Tepe[1]

[1]Faculty of Education, Afyon Kocatepe University, Afyonkarahisar, Türkiye.
[2]Faculty of Sport Sciences, Afyon Kocatepe University, Afyonkarahisar, Türkiye.

Accepted 30 May, 2025

ABSTRACT

In this study, which is aimed to investigate the balance principle of the secondary school science curriculum, a case study, one of the qualitative research methods, was employed. In the study, which was conducted by using case design, data analysis was performed by using teacher opinions, observation, and document analysis. The weighted kappa coefficient was calculated to ensure the validity of the observation results and to purify the results from the chance factor. It is not possible to make a definite definition of the balance principle and to state that a curriculum is in full balance. The concept of balance is always considered as an element that will be incomplete in one aspect. In this respect, it is concluded that student-centered curriculum understanding is in the forefront instead of subject-centered curriculum in the secondary school science curriculum, and it is compatible with student-society needs and width-depth element. In terms of learning areas, it was observed that the balance cognitive domain came to the forefront and the customized education dimension was lack. It is seen that the harmony between being open to innovations and traditional knowledge in the curriculum has been replaced by an instructional design based on the subject logic. In addition to general needs, suitable designs are applied successfully in situations requiring special needs. Similarly, it is seen that the curriculum has an adequate and balanced structure in terms of plans and measures to meet the needs of different students with academic development levels. For the implementation phase of the curriculum, it seen that different variables limit this dimension in terms of methods and techniques used. It has been observed that interdisciplinary harmony cannot be achieved with the connection established between past and present in relation to discipline and that students cannot demonstrate their expected transfer skills. It is thought that the lack of physical activity required by the students to transfer and internalize information is among the reasons for this situation. It was concluded that the opportunity to provide learning outside the classroom and the use of society as an educational laboratory was not included in the implementation of the curriculum.

Keywords: Balance, curriculum, evaluation, science course.

*Corresponding author. E-mail: burakolur@gmail.com. Tel: +90 444 03 03.

INTRODUCTION

According to the system approach in education, curriculum is among the main factors affecting productivity and main requirement input in education (Tan and Erdoğan, 2004). In this context, according to Posner (1995), in order to assess the effectiveness of a curriculum implemented, the deficiencies and problems in the components of the curriculum should be determined based on a criterion.

The balance is considered one of the important factors affecting the success of the curriculum. It is noted that curriculum must have a balance between subjects and activities, between academic and vocational education, between formal and informal education, between compulsory and optional subjects, between direct and indirect experiences, between social and individual aims,

etc. (Moss, 2019). Pawlas and Olivia (2007) stated that there should be a balance principle among the following aspects of the curriculum:

• Between general education and specialized education.
• Between academic and vocational aspects of the curriculum.
• Between content aimed at the intermediate and the long-range needs of learners.
• Between the child-centered approach and the subject-centered approach to the curriculum.

According to the balance principle, in a balanced curriculum students are given the opportunity to use and internalize what they have learned in accordance with their mental, personal, and social development (Doğanay, 2008). Balance means that the complexity of the curriculum is compatible with students' developmental levels (Hewitt, 2006). In other words, the balance of the curriculum can be defined as introducing enough variety of teaching content to contribute to the student's development (Tan, 2011). The concept of balance is difficult to define precisely. Many educational experts agree that curriculum is in an imbalance. Balance in the curriculum is required between the prescriptive elements of a curriculum and to raise self-directed learners (Oliver et al., 2008). A balanced and broadly based curriculum achieves the moral, mental, spiritual, cultural, and physical development of students at school and of society, and prepares students for the experiences, opportunities and responsibilities of later life (William, 2013). A balanced curriculum promotes diverse learning experiences with equal emphasis on developing the knowledge, skills, values, and attitudes of students to provide holistic development of them. The key competencies that the balanced curriculum provides help children deal effectively with the opportunities and challenges they will encounter later in life (UNESCO, 2014). In addition, maintaining a balanced curriculum enables students to learn how to take their own learning responsibilities (OECD, 2009). Moreover, in a balanced curriculum more opportunities for education are offered, all people are provided with basic education and a possibly good education is offered for all people (Bo, 2007).

The concept of balance is difficult to define precisely (Olivia and Gordon, 2018). Balance should not be thought of in terms of equal quantities. In contrast, balance is considered as the adequateness of each necessary element. Based on this, in a balanced curriculum science and swimming classes should not be expected to be included equally (Dearden, 1981). It is stated that, like a balanced diet, a balanced curriculum must meet the needs of individuals. As a result, a balanced curriculum needs to be tentative rather than dogmatic in educational planning (Kelly, 2009). In this case, the balance principle can be considered as an ideal that must have but never fully reached.

The information in the literature indicates that the balance principle has a significant value in promoting successful curriculum applications. Therefore, when preparing the curriculum, the balance principle should be handled in detail. When the literature is examined, it is seen that there are various studies examining the opinions of teachers and students on the curriculum (Kırkgöz, 2008; Kızıldağ, 2009; Baştürk and Dönmez, 2010; Topkaya and Küçük, 2010; Seçkin, 2011; Merter, Kartal and Çağlar, 2012; Alkan and Arslan, 2014; Çelik and Kasapoğlu, 2014; Demirtaş and Erdem, 2015; Ocak and Tepe, 2019). However, it is seen that the balance principle is underestimated in assessing the success of the implemented curriculum. Within this context, this study aims to examine to what extent the balance principle is applied in the curriculum. For this purpose, the question; "Is the 2018 Secondary School Science Course Curriculum prepared in accordance with the balance principle?" is tried to be answered. It is thought that the findings obtained in the study will make a great contribution to the literature and to the field of science education.

Method

In this study, case study was employed. Case study is a methodological approach which includes in-depth analysis of a system to collect systematic information about how a limited system works and by using multiple data collection tools (Chmiliar, 2010). Although the case study, which is an important method of obtaining information about events and behaviors in terms of providing rich and important perspectives (Brown, 2008), has been defined in different ways, 'in depth analysis and description of a situation' is the common point of the definitions. Yin (1984) mentions six sources in the data collection process while conducting case studies: 1. Documents, 2. Archive records, 3. Interviews, 4. Direct observation, 5. Participatory observation, 6. Physical structures. Considering these sources, the following steps were followed in the research:

1. Examining the curriculum and application resources.
2. Semi-structured interviews with teachers on the balance principle.
3. Observation using the co-observer within the scope of the balance principle.
4. Analyzing the data by checking the compatibility of the data obtained from their sources.
5. Interpretation of these findings by associating them with related studies.

Validity and the reliability of the study

Validity and reliability are expected to be at a certain level

in all studies. Merriam (1998) followed the strategies of using diversification making long-term observations, getting opinions from a colleague about the findings, having the data checked through different data sources, the researcher's own opinions and thoughts at the beginning of the study, and involving the participants in the whole process to ensure internal validity in the case studies. Yin (1984) suggested the use of more than one data collection tool in the data collection process, establishing a chain of evidence and planning the study to increase the structure validity. During the data collection process, teachers' opinions were taken and supported by the findings obtained from the observation results. On the other hand, to ensure reliability, the researcher developed the study step by step in a certain system and it was tried to ensure that each step was explained in detail and supported with documents.

Data collection tools

In the study, a semi-structured interview form and observation checklist were used as data collection tools. Detailed information about the data collection tools is given below:

Semi-structured interview form

The semi-structured interview form consists of questions including the evaluations of science teachers' secondary school science curriculum in terms of the balance principle. Semi-structured interview form was used to obtain in-depth information from teachers. The interview technique is very effective in obtaining information about individuals' experiences, attitudes, opinions, complaints, feelings, and beliefs (Briggs, 1986, cited in Yıldırım and Şimşek, 2011). In the preparation of this form, firstly the purpose of the study was taken into consideration and a literature review was conducted on the subject. As a result of the literature review, the interview questions prepared within the scope of this study were presented to the opinions of two experts from the curriculum and instruction field. Based on their opinions, the required corrections were made, the interview form was revised and therefore, the final version was obtained. The study was conducted with 10 science teachers working in different secondary schools in the Aegean region in Turkey.

Observation checklist

An observation list consisting of 18 questions which include the sub-dimensions of the balance principle was created in accordance with the case study model to examine the secondary school science curriculum in terms of the balance principle. During the observation process, two observers took part. In the observation list, the points of the observers were examined in three dimensions as low, medium, and high. The weighted kappa coefficient was calculated in the evaluation of the observation results. As there are more than two categories, the 'weighted kappa method' was preferred to have the results free from the chance factors instead of the kappa method. Weighted kappa coefficient was performed using a statistical program for the observations conducted at the 5th, 6th, 7th and 8th grades.

Data analysis

Qualitative content analysis was used to analyze the data collected after interviews. In qualitative content analysis, the aim is to reach concepts and relations that can describe the data. In qualitative content analysis, the stages of coding themes, and interpreting the findings follow each other (Yıldırım and Şimşek, 2011). Qualitative content analysis has a systematic structure, but as it is not universally accepted, researchers can perform data analysis by following different steps (Çetin, 2016). The data from the interview forms were compared with the findings obtained from the document analysis. The results of the observation conducted by two observers were evaluated by calculating the weighted kappa coefficient. The interpretation of the Kappa coefficient according to the obtained result is as follows:

1. 0 < weak agreement < 0.20
2. 0.21 < acceptable agreement < 0.40
3. 0.41 < moderate agreement < 0.60
4. 0.61 < substantial agreement < 0.80
5. 0.81 < almost perfect agreement < 1.00

Table 1. Weighted kappa test results for 5th grade science course observation.

		Observer 2			
		1 point	2 point	3 point	Total
Observer 1	1 point	2	1	---	9 (16.6%)
	2 point	1	8	1	6 (55.5%)
	3 point	---	1	4	3 (7.7%)
	Total	9 (16.6%)	6 (55.5%)	3 (27.7%)	18 (%100)

Weighted kappa coefficient for inter-observer agreement rates was calculated separately for the 5th, 6th, 7th and 8th grades. The results for the 5th grade are given in Table 1.

The scores of co-observers for 18 questions in the interview form consist of three categories, 1, 2 and 3. According to Table 1, the number of observed items agreed by the observers is 2 + 8 + 4 = 14.

The observation agreement is:

$$\Pr(a) = \frac{14}{18} = 0.77$$

Pr(e) value of the probability that agreement occurs randomly.

For 1 point: 0.16*0.16 = 0.02
For 2 point: 0.55*0.55 = 0.30
For 3 point: 0.27*0.27 = 0.07
Total Pr(e) value = 0.25 + 0.30 + 0.07 = 0.39

According to the observation result conducted in 5th grade, the weighted kappa coefficient was calculated as 0.62. The result shows substantial agreement.

The results for the 6th grade are given in Table 2.

Table 2. Weighted kappa test results for 6th grade science course observation.

			Observer 2		
		1 point	2 point	3 point	Total
Observer 1	1 point	2	1	---	9 (16.6%)
	2 point	1	8	1	6 (55.5%)
	3 point	---	1	4	3 (7.7%)
	Total	9 (16.6%)	6 (55.5%)	3 (27.7%)	18 (%100)

The scores of co-observers for the 18 questions in the interview form consist of three categories, 1, 2 and 3. According to Table 2, the number of observed items agreed by the observers is 8 + 4 + 3 = 15.

The observation agreement is:

$$\Pr(a) = \frac{15}{18} = 0.83.$$

Pr(e) value of the probability that agreement occurs randomly.

For 1 point: 0.50*0.44 = 0.22
For 2 point: 0.27*0.33 = 0.08
For 3 point: 0.16*0.27 = 0.04
Total Pr(e) value = 0.22 + 0.08 + 0.04 = 0.34

Observation result conducted on the 6th grade was calculated as follows:

Weighted kappa coefficient $= \frac{0,83-0,34}{1-0,34} = 0.74$. The obtained results show substantial agreement.

The results for the 7th grade are given in Table 3.

Table 3. Weighted kappa test results for 7th grade science course observation.

			Observer 2		
		1 point	2 point	3 point	Total
Observer 1	1 point	7	1	1	9 (50%)
	2 point	0	4	1	5 (27.7%)
	3 point	0	0	4	4 (22.2%)
	Total	7 (38.8%)	5 (27.7%)	6 (33.3%)	18 (100%)

The scores of co-observers for the 18 questions in the interview consist of three categories, 1, 2 and 3. According to Table 3., the number of observed items agreed by the observers is 7 + 4 + 4 = 15.

The observation agreement is as:

$$\Pr(a) = \frac{15}{18} = 0.84.$$

Pr(e) value of the probability that agreement occurs randomly.

For 1 point: 0.50*0.38 = 0.31
For 2 point: 0.27*0.27 = 0.07
For 3 point: 0.22*0.33 = 0.07
Total Pr(e) value = 0.31+0.07+0.07 = 0.45

Weighted kappa coefficient $= \frac{0,84-0,45}{1-0,45}$ = 0.71. The obtained results show substantial agreement.

Weighted kappa test results for 8th grade science course observation are given in Table 4.

Table 4. Weighted kappa test results for 8th grade science course observation.

		Observer 2			
		1 point	2 point	3 point	Total
Observer 1	1 point	6	1	0	7 (38.8%)
	2 point	1	6	1	8 (44.4%)
	3 point	0	1	2	3 (16.6%)
	Total	7 (38.8%)	8 (44.4%)	3 (16.6%)	18 (100%)

The scores of co-observers for 18 questions in the interview form consist of three categories, 1, 2 and 3. According to Table 4., the number of observed items agreed by the observers is 6 + 7 + 2 = 15. The observation agreement is:

$\Pr(a) = \frac{14}{18}$ = 0.78.

Pr(e) value of the probability that agreement occurs randomly.
For 1 point: 0.38*0.38 = 0.14
For 2 point: 0.44*0.44 = 0.13
For 3 point: 0.16*0.11 = 0.02
Total Pr(e) value = 0.14 + 0.13 + 0.02 = 0.29

Observation result conducted on the 8th grade was calculated as follows:

Weighted kappa coefficient $\frac{0,78-0,29}{1-0,29}$ = 0. 69. The obtained result shows substantial agreement.

The weighted kappa coefficient was obtained as 0.62 for the observations on 5th grade, 0.74 for 6th grade, 0.71 for 7th grade and 0.69 for 8th grade. The obtained results show that the results obtained from the observations are appropriate and can be used. The results obtained from the document analysis, interview findings and observation results were examined and interpreted individually in terms of the sub-dimensions proposed for the balance principle.

FINDINGS

The first-sub problem of the study was aimed to determine the opinions of teachers on the curriculum in terms of being student-centered or subject-centered. Within this context, the question *"How would you define the science curriculum in terms of being student-centered or subject-centered? Can you also explain your opinions by stating the reasons?"* is asked of the teachers. The opinions and the frequencies are presented in Table 5.

Table 5. Teachers' opinions on the science curriculum in terms of being student-centered or subject-centered technology.

Theme	Category	Frequency
Focus of the curriculum	Student-centered	7
	Subject-centered	2

As can be seen in Table 5, most of the teachers (*f*=7) thought that the science curriculum was student-centered. For example, T (teacher) 5 said that: *"I define the curriculum as student-centered. The outcomes in the curriculum are at a level that students can fully understand. Accordingly, the activities in the textbooks are increased, and the content is reduced compared to the old one."* T2 expressed his ideas as "*I can define the curriculum as student-centered. When the curriculum is examined, there are skills such as entrepreneurship, innovative thinking, analytical thinking, and creativity that should be gained by students. The development of these skills can be with a student-centered philosophy".* Similarly, T10 stated that; "*Outcomes are arranged for students to access information. If it were subject-centered, we would have to provide more detailed information for each topic. However, we do not only study information but also how students use information in daily life."*

When the curriculum is examined, the findings confirming the opinions of the teachers can be seen. However, when evaluated together with the results of the observations, it is seen that the curriculum is not in a balance about being student and subject-centered. For example, in the Science Education Curriculum, it is stated that "*Education is given not only for "knowing (thought)" but also for "feeling (emotion)" and "doing (action)"; therefore, only cognitive measurements cannot be considered sufficient* (MoNE, 2018)". On the other hand, in

the observations, it was seen that there was no harmony between the reflection of the program in practice and the program's focus. It was aimed to reveal teachers' opinions on the curriculum in terms of meeting the needs of the students and society together within the second sub-problem of the study. Therefore, the question, "How do you evaluate the adequacy of the science education curriculum in meeting the needs of the students and the society together?" was asked of the teachers. The opinions of the teachers and the frequencies are presented in Table 6.

Table 6. Teachers' opinions on the curriculum in terms of meeting the needs.

Theme	Category	Frequency
Evaluation of the curriculum in terms of needs	Meeting the needs of students	6
	Meeting the needs of the society	1

As seen in Table 6, most of the teachers (f = 6) think that the science curriculum meets the needs of the students. On this issue, T8 states that *"The students learn the subject that needs to be learned at the moment, but they cannot apply the knowledge in their daily lives. To meet the needs of society, the student must transform their families and the families should transform the individuals around them in terms of attitude and behavior. Therefore, I do not think the curriculum responds to the needs of the society."* Similarly, T7 said; *"I think the curriculum is intertwined with daily life. It must meet the needs of the society and the student together, but I think the curriculum is insufficient in this context"* Lastly, T1 indicated that; "*The curriculum is not directed towards the needs of the society but offers opportunities such as project work in areas of interest to the student. For example, when we make announcements for TUBITAK (Scientific and Technological Research Council of Turkey) competitions in our school, eager students present their ideas."*

In the observations, it was observed that the students could not integrate the information they learn into their daily lives. For example, it is stated in the learning outcome of F.6.5.4.5. that; *"Students can design environments that will set an example for sound insulation or acoustic applications."* It is seen that in this outcome, it is not stated that students use as much time as they wish and interests. The fact that teachers are in a rush to follow the curriculum causes problems with this aspect, it is concluded that the curriculum is not compatible in terms of being student and society-oriented.

The third sub-problem of the study aimed to reveal teachers' opinions on whether the content of the science curriculum shows a balanced distribution with the sub-branches of the course (physics, chemistry, biology). The opinions of the teachers and the frequencies are presented in Table 7.

Table 7. Teachers' opinions on the curriculum in terms of having a balanced distribution.

Theme	Category	Frequency
Examination of the curriculum in terms of the sub-branches of the course	Balanced distribution	8
	More focused on physic course	1
	More focused on biology course	1

Teachers' opinions revealed that they mostly (f=8) found the science curriculum balanced. For example, T8 said that; *"Distribution is balanced in terms of sub-branches of the course."* T2 indicated that; *"It can be said to be balanced."* Similarly, T3 stated that; *"It is balanced in terms of outcomes."* On the contrary, T2 stated that; *"When I evaluate the curriculum according to its sub-branches, I do not think it is distributed in a balanced way. I think the topics in the physics sub-branch are more."*

When the content of the program is examined, it is seen that it is aimed at gaining basic information about astronomy, biology, physics, chemistry, earth and environmental sciences, science and engineering applications, and the content is distributed in a balanced way.

The fourth sub-problem of the study aimed to determine whether learning outcomes of science education curricula have a balanced distribution in terms of cognitive, affective and psychomotor aspects. The opinions of the teachers and the frequencies are presented in Table 8.

Table 8 shows that most of the teachers (f=6) in the curriculum cognitive outcomes are more focused. Some of the teachers' opinions about this issue are as follows*: "Learning outcomes are sufficient in terms of cognitive and psychomotor domains. But when I examine the curriculum in terms of affective domain, it is insufficient."* (T1)

"Cognitive domain is more focused in the curriculum. I think this situation is not limited to the science curriculum." (T2) *"In my opinion, if the program would be reorganized, changes should be made for students' interests and expectations. Cognitive and psychomotor domains are already focused. The affective dimension should also be focused."* (T4)

Table 8. Teachers' opinions on the distribution of learning outcomes.

Theme	Category	Frequency
Distribution of learning outcomes in terms of cognitive, affective and psychomotor aspects	Cognitive	6
	Affective	1
	Psychomotor	2

When the learning outcomes of the curriculum are examined, it is seen that teachers are expected to consider that acquiring a learning outcome in a domain will affect another domain in the process and that the curriculum has been prepared in this direction. The difference between the curriculum and the reflection of the curriculum on the implementation was interpreted as neglecting the balance dimension in the curriculum.

To examine the appropriateness of the science curriculum for individualized and general education, the question "How do you evaluate the appropriateness of the science curriculum for individualized education?" was asked of the teachers. It was seen that the opinions of the teachers and the findings obtained from the curriculum were different. It was concluded that teachers mostly (f = 6) stated that individualized education was neglected. The opinions of the teachers and the frequencies are presented in Table 9.

Table 9. Teachers' opinions on the curriculum in terms of being individualized and general.

Theme	Category	Frequency
Appropriateness for individualized education or general education	Appropriate for individualized education	1
	Appropriate for general education	8

As can be understood, teachers find the science curriculum appropriate for general education. For example, T6 said that; "*I don't find it appropriate. It should also be appropriate for individual development as well as other courses such as mathematics." T9 stated that; "I do not think that the science curriculum is very appropriate for individual education, it is mostly prepared for classroom education." Lastly, T10 indicated that; "It is not possible to allocate enough time for each student in the school, since the course hours allocated for the learning outcomes are taken into consideration. When examining the curriculum, it seems to be appropriate for individual education. In practice, the situation is different*."

It was emphasized in the curriculum that it was prepared by considering the sensitivities regarding individual differences (MEB, 2018). However, teachers' opinions and observation results emphasize that individualized education is neglected in this regard.

In the science education curriculum, teachers were asked to evaluate the content item in terms of the conformity of the subjects and the conformity of the student logic. It was concluded that the teachers generally evaluated the curriculum as being repetitive by spiraling and deepening (f = 4) and thought that it was not suitable for student logic (f = 4). The opinions of the teachers and the frequencies are presented in Table 10.

Table 10. Teachers' opinions on the compatibility of the content.

Theme	Category	Frequency
Appropriateness of the content in terms of conformity of the subjects and the conformity of the student logic	Conformity of the subjects	3
	Deepening by the repetitions	5
	Being dependent on the teachers	1

Some of the teachers' opinions on this theme are as follows: *"The content is arranged in a spiral. In the 5th, 6th, 7th and 8th grades, all topics are continuation of each other, and the content of the subject gets deeper as the grade level increase"* (T5) *"Some concepts do not fit on the logic of the student. I experience this situation especially in abstract concepts. For example, they have problems with mitosis, meiosis, and planets."* (T10). *"I think it is important how the teacher handles the subject and the student rather than the student. Sometimes, some issues are skipped while focusing on a topic. I think this depends on the teacher."* (T3).

In the interviews conducted with the teachers, it was concluded that the content has a spiral structure. Both the teachers' opinions and the observation results show that the content deepens with the grade level. When the distribution of subjects by years is examined in the curriculum, it is seen that the subjects get deeper as the grade level increases. It is concluded that the program has a balanced structure in this respect.

To evaluate whether the science education curriculum meets the needs of students at the normal level and the needs of the students at a high level, the question "How do you evaluate the science curriculum in terms of meeting the needs of the students at the normal level and the needs of the high-level students?" was asked to the teachers. The opinions of the teachers and the frequencies are given in Table 11.

Table 11. Opinions of the teachers on the appropriateness of the curriculum for students with different levels.

Theme	Category	Frequency
Appropriateness of the curriculum for students with different levels	Appropriate for the students at a normal level	6
	Appropriate for the students at a high level	6
	Inappropriateness of the curriculum for student-level	1

Teachers stated their opinions that the curriculum meets the needs of the students at a normal level and at a high level. On the contrary, one teacher stated that the curriculum is not appropriate for the student level. On this issue, T5 said that; *"The curriculum meets the needs of students at two levels."* T7 stated that; *"I think that the curriculum meets the needs of students at normal level, and I think that it fully meets the needs of students at high level. Some students at high levels are even able to learn the outcomes at the upper grade."* T3 indicated that; "*The learning outcomes and the course book are sometimes incompatible. While there is a high-level outcome, there are not enough examples in the book for this. Therefore, evaluating this issue can be misleading."* Lastly, T6 said; *"I think the curriculum is appropriate for the two levels.* It is emphasized in the curriculum that individual differences arising from hereditary, environmental and cultural factors are taken into consideration and there is an expectation from teachers in this direction during the implementation phase. In the observation process, it was observed that there was a harmonious structure for different levels at the implementation stage of the curriculum. In this respect, it is seen that the curriculum has a balanced structure.

The next sub-problem of the study aimed to reveal the teachers' opinions on the appropriateness of the curriculum in terms of using different techniques such as written, visual, and verbal techniques. Teachers' opinions and the frequencies are presented in Table 12.

Table 12. Appropriateness of the curriculum in terms of using different techniques.

Theme	Category	Frequency
Appropriateness for using different techniques	Appropriate	8
	Inappropriate	2

As can be seen in Table 12, most of the teachers (f = 8) found the curriculum appropriate for using different techniques. On the contrary, two teachers were of the opinion that the curriculum was inappropriate. On this issue, T2 said; *"In the course, written, visual and verbal techniques can be used easily. These techniques are chosen according to the structure of the subject."* T5 indicated that; *"The curriculum is suitable for the use of all techniques. However, it is generally used in writing and verbally. If necessary, materials are provided, and the techniques are supported visually. However, thanks to the experiment simulations in EBA, even if that experiment is not performed in the classroom, it is visually supported by EBA."* Lastly, T9 said; "*I think the curriculum is appropriate*

and sufficient for all techniques."

In the observations, it was observed that the teachers included different applications according to class level. In this respect, it was concluded that the balance factor was kept in the curriculum. In addition, the opinions obtained from teachers, observation results and document analysis were found to be compatible.

To examine the harmony between the academic aspect of the science curriculum and sports, entertainment and physical activities, the teachers were asked the question "How do you evaluate the balance between the academic aspect of the Science curriculum and sports, entertainment, and physical activities?" Teachers' opinions and the obtained frequencies are presented in Table 13.

Table 13. Teachers' opinions on the balance between the academic aspect of the science curriculum and sports, entertainment, and physical activities.

Theme	Category	Frequency
the balance between the academic aspect of the science curriculum and sports, entertainment, and physical activities	A balanced distribution	2
	An imbalanced distribution	7

Table 13 shows that most of the teachers (f = 7) think that the curriculum has an imbalanced structure in terms of the academic aspect of the Science curriculum and sports, entertainment, and physical activities. Some of the teachers' opinions on this issue are as follows*: "It is quite insufficient. The activities to be held in the garden can be based on the subject, but we cannot even do it with the fear that the administration will not let."* (T8) "*I don't think that the curriculum is balanced in this context. Other activities are not so beneficial since the learning outcomes are mostly focused on cognitive domain."* (T9) "*While some subjects such as electricity, simple machines and shadow require physical activities, some others are based on reading completely. So, the curriculum is not compatible."* (T6)

While teachers' opinions and observation results are incompatible on this issue, it is seen that it is aimed to constitute a balanced structure within the scope of science, engineering, and entrepreneurship applications (MEB, 2018). The difference observed between the curriculum and its implementation is interpreted as that the curriculum does not have a balanced and harmonious structure.

To examine whether the science curriculum provides opportunities for in-class and out-of-class learning, the question "How do you evaluate the Science curriculum in terms of its capacity to provide opportunities for in-class and out-of-class learning?" was asked to the teachers. The opinions of the teachers and the frequencies are presented in Table 14.

Table 14. Teachers' opinions on the curriculum in terms of providing opportunities for in-class and out-of-class learning.

Theme	Category	Frequency
Providing opportunities for in-class and out-of-class learning	Appropriate	2
	Inappropriate	7

It was concluded that teachers expressed their negative opinions on the curriculum in terms of providing opportunities for out-of-class learning (f = 7). On this issue, T5 said that; *"In-class learning is sufficient, but since there is not enough out of class activities, students completely forget what they learn after one month. Students almost react as they have never learned the subjects."* T2 indicated that; *"Although the curriculum seems to give opportunities to learning outside the classroom, we cannot get this opportunity."* T3 stated that; *"Since the learning outcomes overlap, we must move from one to the other without fully implementing it. That's why there are no broad opportunities for out-of-class applications."*

Different findings were obtained between the teachers' opinions and the curriculum in this regard. While the observation results and the findings obtained from the interviews conducted with the teachers indicate that the curriculum does not include different learning opportunities, it is recommended to include different learning environments in the curriculum and to evaluate the learning with alternative applications. In this respect, it is seen that the balance dimension is neglected in the curriculum within this context.

In order to examine the harmony of the science curriculum with other courses, the question "How do you evaluate the harmony of the science curriculum with other courses?" was asked of the teachers. The opinions of the teachers and the frequencies are presented in Table 15.

Table 15. Teachers' opinions on the harmony of science curriculum with other courses.

Theme	Category	Frequency
Harmony of science curriculum with other courses	Positive opinions	10
	Negative opinions	0

It is concluded from Table 15 that teachers have positive opinions on this issue (f = 10). Some of the teachers' opinions on this issue are as follows: *"I can evaluate the science curriculum in harmony with other courses. When its learning outcomes are examined, it supports not only science but also other courses."* (T2) *"It is an interdisciplinary curriculum. For example, while students learn renewable energy sources in science, they also deal with the same subject in the social studies course."* (T8)

When the curriculum is examined, it is concluded that it has a balanced structure in terms of being compatible with other courses. Teacher opinions and observation results indicate that the curriculum is in line with social studies and mathematics courses. It is also recommended to establish a connection between engineering and science applications in the curriculum (MoNE, 2018).

The next sub-problem of the study was aimed to reveal teachers' opinions on the curriculum in terms of providing opportunities for different learning approaches. The opinions and the frequencies are presented in Table 16.

Table 16. Teachers' opinions on the curriculum in terms of providing opportunities for different learning approaches.

Theme	Category	Frequency
Providing opportunities for different learning approaches	Positive opinions	7
	Negative opinions	2
	Implementation depends on the teacher	1

As can be seen from the table, most of the teachers (f = 7) have positive opinions on the curriculum and they think that the curriculum provides opportunities for different learning approaches. On this issue, T8 said; "*It is appropriate for the use of all approaches based on constructivist understanding." Similarly, T6 stated that; "It provides opportunities for different learning approaches. I think teachers have a great role in this situation. We want to answer the question of why, so we can investigate, inquire, and establish a cause-and-effect relationship. We expect students to answer the question of "why.*"

It is seen that the curriculum has a flexible structure and supports teachers in using alternative approaches. Teachers' opinions are also indicating that the curriculum has a structure that is appropriate for different approaches. However, the results of the observation show that the use of different approaches in the curriculum is at a low rate. It is thought that this situation is shaped by the effects of different variables such as class level, physical facilities, and environment.

To examine the appropriateness of the content of the science education curriculum with the development levels of the students, the question *"How do you evaluate the appropriateness of the content of the science education curriculum with the development levels of the students?"* was asked to the teachers. The opinions and the frequencies are given in Table 17.

Table 17. Teachers' opinions on the appropriateness of the curriculum with the development levels of the students.

Theme	Category	Frequency
Appropriateness of the curriculum	Positive opinions	7
	Negative opinions	4

It was obtained from teachers' opinions that the curriculum was appropriate for the development levels of the students. Some of the teachers' opinions on this issue are as follows: "*Subjects are generally appropriate. It was harder before. Especially in the fifth grade, teaching is very flexible compared to other grades."* (T3) *"Thanks to the renewed curriculum, the content was reduced considerably and adapted to the development levels of the*

students." (T8) *"It is appropriate for the development levels of the students, but I find it difficult to make connections between grades."* (T6)

The opinions of the teachers indicate that the density of the curriculum has been reduced with the changes made in recent years and flexibility has been provided in the implementation process. The observation results show that the curriculum is in line with the development level of the students.

The last sub-problem of the study aimed to reveal teachers' opinions on the curriculum in terms of being dependent on innovations and traditions. The opinions and the frequencies are presented in Table 18.

Table 18. Teachers' opinions on being traditional and innovative.

Theme	Category	Frequency
Being traditional and innovative	Innovative	2
	Traditional	7

As can be seen from Table 18, most of the teachers (f = 7) find the curriculum traditional. On this issue, T5 said; *"Although it is appropriate for applying innovations, it is more traditional."* Similarly, T6 indicated that; *"We want children to be interested and curious to learn new information. We expect them to do research. But the exams leave all of this aside."* Lastly, T3 indicated that; "*As long as there is an existing examination system, I think it is not possible to have students who research."*

When the curriculum is examined, it is emphasized that it is open to innovations, but teacher opinions and observation results do not support this. It is seen that both teacher opinions and observation results are far from the learning outcomes envisaged in the curriculum. It is concluded that the innovative expressions and outcomes in the curriculum are not reflected in the implementation.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The balance element in the program is considered as a dimension that is expected to be in every program, but which can never be achieved perfectly. Many of the subjects in science are abstract (Emrahoğlu and Mengi, 2012; Oon and Subramaniam, 2011; Taşdemir and Demirbaş, 2010). Abstract topics reduce students' participation in the lesson, in this case, they reduce students' interest in the lesson and affect the structure of the curriculum. Ensuring the active participation of the student in the process is important in terms of providing opportunities for in-class and out-of-class learning. For the reliability of the data obtained in the analysis of the program in terms of balance dimension, the result obtained from the weighted kappa coefficient is that the observation findings can be included in the evaluation. The themes and categories obtained to interpret the analyzes carried out from the part to the whole more healthily and holistically in the interpretation of the qualitative data that support the observation results are shown in Figure 1.

When the findings shown with the diagram are examined, it is seen that the balance dimension is affected by many variables and sub-dimensions related to these variables. Therefore, it is seen that the change made in any sub-dimension of the curriculum will affect the whole from different aspects. It is expected that the focus of the curriculum is student-centered or subject-centered, with the expected balance to be established, and it is expected to ensure that the learning is permanent. Science lessons learned by doing and experiencing active learning improve students' questioning skills. Students learn to identify problems, make observations, form hypotheses, collect and analyze data, and generalize with science lessons conducted by doing rather than memorizing (Açıkgöz, 2008; Lind, 2005). Active learning methods are also extremely effective on students' democratic attitudes and behaviors. At the same time, educators agree that there is a strong link between the success of a course and the interest and value given by the student to the course (Yeşiloğlu, Karaca and Şimşek, 2017). It is thought that the improvement works carried out to ensure the balance principle in every dimension of the curriculum will affect more than one variable. As a result of the document analysis, interviews and observations carried out within the scope of the research, it was concluded that the student-centered program approach is at the forefront instead of the subject-centered curriculum approach, and it is compatible in terms of student-society needs and in terms of breadth-depth. In terms of learning areas, it was observed that the cognitive area came to the fore and the customized education dimension was missing. It is seen that the harmony between being open to innovations and traditional knowledge in the curriculum has left its place for an instructional design based on the logic of the subject. In the curriculum, suitable designs are successfully applied in situations that require special needs as well as general needs. Likewise, it is seen that the program has a sufficient and balanced structure in terms of plans and measures to meet the needs of students with different academic development levels. For the implementation phase of the

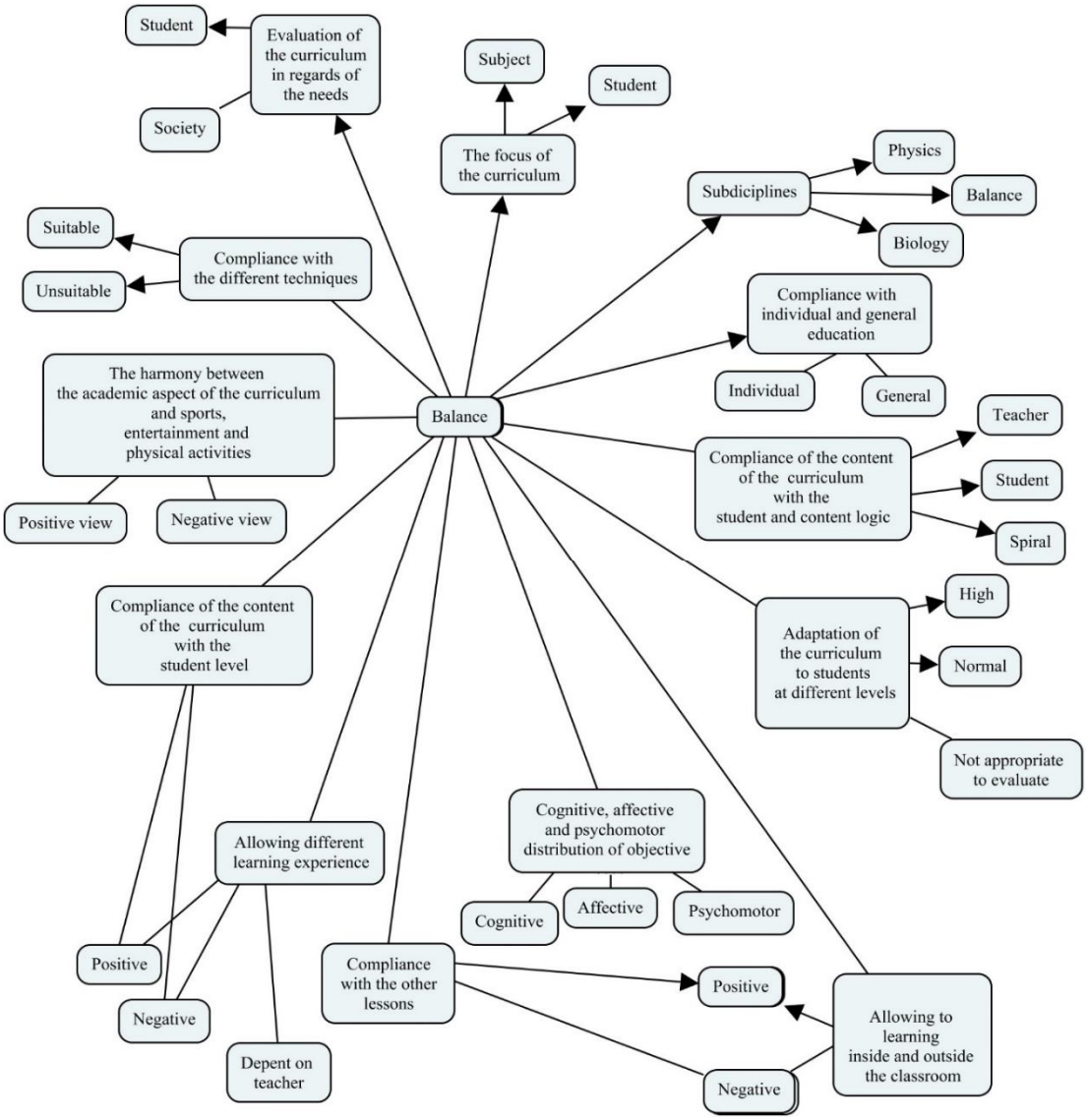

Figure 1. The summary of the observation result.

curriculum, it is seen that different variables limit this dimension in terms of the methods and techniques used. It has been observed that the connection between the past and the present regarding the discipline could not be achieved and the interdisciplinary harmony could not be achieved, and the students could not exhibit the expected transfer skills. The lack of physical activities necessary for students to transfer and internalize knowledge is thought to be one of the reasons for this situation. It has been concluded that providing opportunities for out-of-class learning and the use of society as an educational laboratory are not included in the implementation of the curriculum. In order for the balance dimension to be close to the ideal in the curriculum, it is recommended that the changes be accepted as a part of the development process instead of perceiving them as reforms. It may be suggested to involve stakeholders in the curriculum development process in order to shorten the adaptation period to the changes that are expected to be realized inevitably. The work to be done for the principle of balance will increase in today's world, where the rate of change is constantly accelerating. The accordance and adaptation process experienced after the revision studies should be considered as important as the curriculum development process.

REFERENCES

Açikgöz, K. Ü. (2008). *Aktif öğrenme*. İzmir: Eğitim Dünyası Yayınları.
Alkan, M. F., and Arslan, M. (2014). Evaluation of the 2nd grade English

language curriculum. *Uluslararası Eğitim Programları ve Öğretim Çalışma.*

Baştürk, S., and Dönmez, G. (2011). Examining pre-service teachers' pedagogical content knowledge with regard to curriculum knowledge. *International Online Journal of Educational Sciences*, *3*(2).

Bo, Z. (2007). Balanced education development: Theory, target and measuring methods. *Frontiers of Education in China, 2*(4), 494-527.

Brown. A. P. (2008). A review of the literature on case study research. *Canadian Journal for New Scholars in Education*, *1*(1), 1-13.

Çelik, S., and Kasapoglu, H. (2014). Implementing the recent curricular changes to English language instruction in Turkey: Opinions and concerns of elementary school administrators. *South African Journal of Education*, *34*(2).

Çetin, I. (2016). Nitel içerik analizi. M. Y. Özden & Levent Durdu (Ed.), *Eğitimde üretim tabanlı çalışmalar için nitel araştırma yöntemleri* (pp.125-148). Ankara: Anı Yayıncılık.

Chmiliar, l. (2010). *Multiple-case designs*. In A. J. Mills, G. Eurepas & E. Wiebe (Eds.), Encyclopedia of case study research (pp 582-583). USA: SAGE Publications.

Dearden, R. (1981). Balance and coherence: some curricular principles in recent reports. *Cambridge Journal of Education, 11*(2), 107-118.

Demirtaş, Z., and Erdem, S. (2015). 5. sınıf İngilizce dersi öğretim programı: Güncellenen programın bir önceki programla karşılaştırılması ve programa ilişkin öğretmen görüşleri. *Sakarya University Journal of Education*, *5*(2), 55-80.

Doğanay, A. (2008). Çağdaş sosyal bilgiler anlayişi işiğinda yeni sosyal bilgiler programinin değerlendirilmesi. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *17*(2), 77-96.

Emrahoğlu, N., and Mengi, F. (2012). İlköğretim sekizinci sınıf öğrencilerinin fen ve teknoloji konularını günlük hayat problemlerinin çözümüne transfer düzeyinin incelenmesi. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *21*(1), 213-228.

Hewitt, T. (2006). *Understanding and shaping curriculum: What we teach and why*. California: Sage Publications Inc.

Kelly, A. V. (2009). *The curriculum: Theory and practice*. Sage.

Kırkgöz, Y. (2008). A case study of teachers' implementation of curriculum innovation in English language teaching in Turkish primary education. *Teaching and teacher education*, *24*(7), 1859-1875.

Kizildag, A. (2009). Teaching English in Turkey: Dialogues with teachers about the challenges in public primary schools. *International Electronic Journal of Elementary Education*, *1*(3), 188-201.

Lind, K. K. (2005). *Exploring science in early childhood education*. New York: Thomson Delmar Learning.

Merriam, S. B. (1998). *Qualitative research and case study applications in education.* San Francisco: Jossey-Bass Publishers.

Merter, F., Kartal, Ş., and Çağlar, İ. (2012). Ortaöğretim İngilizce dersi yeni öğretim programının öğretmen görüşlerine göre değerlendirilmesi. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*, *1*(23), 43-58.

MoNE (Ministry of National Education. (2018). İlköğretim kurumları ilkokullar ve ortaokullar fen bilimleri dersi (3, 4, 5, 6, 7 ve 8. sınıflar) öğretim programı. http://ttkb.meb.gov.tr/www/ogretimprogramlari/icerik/72.

Moss, A. (2019). *Curriculum development in elementary education*. Scientific e-Resources.

Ocak, G., and Tepe, M. E. (2018). Evaluation of 5th grade Turkish mathematıcs curriculum according to students' and teachers' views. *Mojes: Malaysian Online Journal Of Educational Sciences, 7*(1), 23-34.

OECD, C. E. T., and Environments, L. (2009). First Results from TALIS. *Teaching and Learning International Survey*.

Oliver, R., Kersten, H., Vinkka-Puhakka, H., Alpasan, G., Bearn, D., Cema, I., ... and Jeniati, E. (2008). Curriculum structure: principles and strategy. *European Journal of Dental Education*, *12*, 74-84.

Olivia, P.F., and Gordon, R.G. (2018). *Developing the curriculum*. Boston: Pearson.

Oon, P. T., and Subramaniam, R. (2011). On the declining interest in physics among students-from the perspective of teachers. *International Journal of Science Education, 33*(5), 727-746.

Pawlas, G. E., and Oliva, P. F. (2007). *Supervision for today's schools*. John Wiley & Sons Inc.

Posner, J. G. (1995). *Analyzing the curriculum*. Second Edition. McGraw-Hill, Inc.

Seçkin, H. (2011). İlköğretim 4. sınıf İngilizce dersi öğretim programına ilişkin öğretmen görüşleri. *Uluslararası İnsan Bilimleri Dergisi*, *8*(2), 550-577.

Tan, Ş., and Erdoğan, A. (2004). *Öğretimde Planlama ve Değerlendirme* (6. Baskı). İstanbul: PegemA Yayıncılık.

Taşdemir, A., and Demirbaş, M. (2010). İlköğretim öğrencilerinin fen ve teknoloji dersinde gördükleri konulardaki kavramları günlük yaşamla ilişkilendirme düzeyleri. *Uluslararası İnsan Bilimleri Dergisi, 7*(1), 124-148.

Topkaya, E. Z., and Küçük, Ö. (2010). An evaluation of 4th and 5th grade English language teaching program. *İlköğretim Online*, *9*(1), 52-65.

UNESCO (2014). The national curriculum framework. http://www.unesco.org/education/edurights/media/docs/2cda5a0a236191e565a7e98f824f23c08b5dad32.pdf.

William, D. (2013). *Principled curriculum design*. SSAT (The Schools Network) Limited.

Yeşiloğlu, Ö., Karaca, S., and Şimşek, Ö. (2017). Akran öğretimi yönteminin ortaokul öğrencilerinin fen ve teknoloji dersindeki başarısına etkisi. *Akademik Sosyal Araştırmalar Dergisi*, *5*(41), 309-320.

Yıldırım, A., and Şimşek, H. (2011). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Seçkin Yayıncılık.

Yin, R. (1984). *Case study research: design and methods*. (3. Basım). California: Sage Publications.

Citation: Ocak, G., Olur, B., and Tepe, M. E. (2025). Examination of the secondary school science curriculum in Türkiye in terms of balance principle. *African Educational Research Journal, 13*(2), 245-257.