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Review

A Systematic Compilation of the Problems Encountered by Teachers and Students in Science and Arts Centers in Turkey

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Abstract: In Turkey, Science and Arts Centers (BİLSEM) were opened and put into practice in 1995 in order to support gifted and talented students who are different from their peers in academic, social, and artistic fields in addition to their formal education. However, as in every educational institution, many problems have emerged in BİLSEMs, which teachers and students try to overcome. In this research, we aim to address the problems that teachers and students in BİLSEMs face or experience. To this end, the study employed a systematic compilation method, a qualitative research method, and theses, articles, papers, and books that were published between 1995 and 2022 and could be accessed were included in the study. In accordance with the purpose of the study, the research data were compiled by entering the keywords "BİLSEM", "Gifted", and "Talented" in the databases and analyzed with content analysis. As a result of the reviews, 46 articles, 15 theses, 1 paper, and 1 book focusing on teacher and student problems were included in the study. In light of the results obtained in the study, it was concluded that the problems experienced by teachers include shortages in materials, physical conditions and infrastructure, insufficient professional development opportunities, the programs not being functional and adequate, and student absenteeism and that the problems experienced by students include the intensity of the program and participating in too many activities, insufficient infrastructure and a lack of materials, being excluded from their circle of friends, and high expectations.

Keywords: science and arts center; BİLSEM problems; gifted; talented; review

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1. Introduction

Culture is an important element for the survival of societies. In order to survive, societies deliberately and consciously attach importance to cultural transfer and aim to train people to adapt to their cultural contexts. Undoubtedly, education is one of the most important aspects to train humans for society's cultural structure [1]. In fact, education systems aim to train individuals who know themselves and their culture, are aware of their own potential, and can develop their potential. The education system and education programs in Turkey have adopted a student-centered education approach. Educational processes where the student is placed at the center aim to uncover individual differences and the potential of individuals. In an educational system where the difference of each student is brought to the fore, the education process of individuals who are considered to be gifted gains greater importance. The main determining factor for the achievement of sustainable development is education [2]. Sustainable development education emphasizes education that will help students to create and develop a more sustainable economy, environment, and social order, think about the future, and make strategic plans [3]. Due to the existing potential of gifted students, they are of great importance in the sustainable development of countries.

Gifted individuals are defined in the literature as "individuals who have higher cognitive performance than their peers and have high potential in a specific talent" [4–6]. In the Ministry of National Education Directive on Science and Arts Centers (2007), gifted students are defined as "individuals determined by experts to have a potential beyond their age in areas such as arts, leadership, production and creativity". In addition, it has been stated that gifted children show a development that is ahead of their peers in the physical domain, and they speak and walk earlier [7]. The common point of these definitions is that gifted individuals have different and superior characteristics and abilities from their peers. Thus, it is obvious that, in educational systems, individual differences are important, and these differences are of particular importance in the education process of gifted individuals. Taking into account the needs of gifted students and making plans in line with their interests and needs will contribute not only to the society in which they live but also to humanity. Gifted individuals are individuals who, in addition to possessing theoretical knowledge, are inquisitive, questioning, creative, have problem-solving skills, can take firm steps towards self-realization, and will contribute to the production of knowledge [8]. In the research conducted by Schack and Starko, referring to the opinions of teachers from different branches (n = 308), it was found that there is a parallelism between being good at lessons and being gifted, and Neumeister, Adams, Pierce, Cassady, and Dixon [9], regarding teachers' opinions on gifted individuals, defined individuals as independent, highly motivated, and creative, learning faster than their peers and having a high understanding capacity. In the study conducted by Moon and Brighton [10], the majority of teachers (n = 434) had traditional views when describing gifted individuals. In the study of Gökdere and Ayvacı [11], teachers stated that they do not have enough information to define gifted individuals. Akar and Akar [12] supported the findings of Gökdere and Ayvacı [9] in their study with 155 teachers. When the findings obtained in the research are evaluated, and when the opinions of the teachers on the definition of gifted students are considered, it can be seen that concepts such as course success, creativity, and motivation come to the fore, and as in the research findings of Gökdere and Ayvacı [11], it can be seen that some teachers do not have sufficient knowledge about the subject. Therefore, teachers working with gifted individuals should be equipped and have sufficient knowledge in this regard.

Indeed, it is evident that traditional classroom environments are insufficient to attend to the differences of gifted individuals and support their development. It has been stated that, if the education of these individuals is limited to traditional classrooms, their abilities may be dampened and they may be unhappy [13]. Renzulli [14] developed the Three Ring Theory. Renzulli argues that gifted individuals have above-average motivation and creativity. According to him, superior talent emerges with the interaction of the three rings: giftedness, motivation, and creativity. The absence of being above average in any of these circles means the absence of being gifted.

According to Renzulli [15], a high IQ is not sufficient to be gifted. In addition, the gifted student must have motivation and creativity. According to Renzulli [16,17], the prevalence of gifted individuals in society is between 2% and 3%, while the general or special talent circle is between 15% and 20%. As can be understood from this expression, giftedness, which is expressed as general and special abilities, is not limited to a certain degree and is stated as being above average.

An education process in which gifted students are separated from their peers has been considered detrimental to a democratic education process [18,19]. However, a privileged education has been considered a necessity for gifted students and the potential of these individuals will be increased by the education offered to them in accordance with their needs [8,20–22]. The general opinion that emerges regarding the education of the gifted is that the normal school curriculum is insufficient for the education of these children. For this reason, various training programs on the subject have been established in different countries. There is no special school for gifted children in the UK. However, there are schools where they can obtain education in fields such as church grove, music, ballet, and

theater. The differentiation of education in schools in England according to student abilities has created the opinion that there is no need for a separate education program for gifted students [23]. In Germany, an integrative education is planned for gifted students and special classroom practices are carried out when necessary. In Finland, important steps have been taken in special education, but necessary studies are not carried out for gifted individuals [24]. In Turkey, Science and Arts Centers were opened to meet the privileged education needs of gifted students.

Science and Arts Centers (BİLSEMs) offer an after-school program in line with "The Decree Law No. 573 on Special Education published in the Official Gazette dated 6 June 1997 and numbered 23011 and the Special Education Services Regulation published in the Official Gazette dated 31 May 2006 and numbered 26184, (2013)", and the first Science and Arts Center was opened in 1995. Students can attend BİLSEM courses either in the evenings on weekdays or during the weekend. BİLSEM provides education opportunities for gifted children in primary, middle, and high school in order to develop their potential. The BİLSEM education model adopts a project-based approach [25–27]. The selection of students for BİLSEM takes place in three stages. The teacher at the school attended by the student nominates the student; the nominated student is subjected to the group intelligence test; and if he/she passes it, the selection process is completed with the individual intelligence test. If the total score of the student is higher than 130 IQ points, the student is entitled to enroll in BİLSEM. The enrolled student completes his/her education in a context that adapts, supports, and recognizes individual talents, developing special talents and project programs. In the BİLSEM education model, while students continue the education process with their peers during formal school hours, they receive the BİLSEM program education outside of formal school hours. The training areas and framework program of BİLSEM are pre-determined, while the application process and methods are left to the discretion of the implementer [28]. This results in different applications. Therefore, it is not possible to achieve unity in BİLSEMs in terms of educational processes. In addition, the uncertainty in the program may cause difficulties in relating it to the formal school curriculum. These difficulties also create different problems.

In this context, the purpose of the current study is to collect studies that deal with the problems experienced by students attending BİLSEMs and the teachers who manage the process. To this end, a literature review focused on articles published, papers presented in congresses and symposiums, and books published between 1995 and 2022 was conducted, and 46 articles, 15 theses, 1 paper, and 2 books published on the subject were included in the study.

The following are the research questions of the current study conducted to reveal the problems experienced by students and teachers in Science and Arts Centers:

1. What is the distribution of the studies focused on the problems experienced by students attending BİLSEMs and the teachers who manage the process across the years?
2. What research methods have been used in the studies focused on the problems experienced by students attending BİLSEMs and the teachers who manage the process?
3. What problems have been mentioned and how frequently in the studies focused on the problems experienced by students attending BİLSEMs and the teachers who manage the process?

2. Materials and Methods

2.1. Research Design

As we aimed to determine the studies focused on the problems experienced by the teachers and students in Science and Arts Centers and to systematically gather the data obtained from these studies in the current review, the systematic compilation method, a qualitative research approach, was used as the research design. A systematic compilation is a systematic and unbiased review of studies on the same subject, in accordance with pre-determined criteria, in order to find answers to research questions in the context of the main purpose of the research, checking the validity of the studies found and synthesizing

them [29]. A systematic compilation is a research method that produces the strongest foundations for evidence-based practices. Through this research method, the findings of multiple studies suitable for the research are compiled and the best evidence is created by making the necessary analyses [30]. According to Aslan [31], a systematic compilation is a scientific review in which studies are reviewed in detail and their findings are synthesized. The common point of the definitions is that systematic compilation provides a comprehensive research opportunity and that the studies are included in the study in the context of the pre-determined criteria, with the studies being determined and their findings synthesized.

2.2. Data Collection and Analysis

Studies published in national journals, theses retrieved from the Higher Education Thesis Centre, papers presented at congresses and symposiums, and other documents on the problems experienced by teachers and students in BİLSEMs between 1995 and 2022 were included in the current study. However, since there was no study on the subject between 1995 and 2007, the scope of the study was narrowed to cover the period between 2007 and 2022. In accordance with the purpose of the study, the research data were obtained by entering the keywords "BİLSEM", "Gifted" and "Talented" in the databases of ULAKBİM. In content analysis, similar data are gathered around the axis of certain concepts and themes, and then they are interpreted by arranging them in a format that can be understood by the readers [32]. The literature review continued until September 2022. As a result of the review, 46 articles, 15 theses, 1 paper, and 2 books focused on the problems experienced by students and teachers in BİLSEMs were included in the study.

The criteria used in the inclusion of the studies in the current study were as follows: 1. the studies had to have been carried out between 1995 and 2022; 2. the studies had to have samples consisting of participants living within the borders of Turkey; 3. the study findings had to include student and teacher problems about BİLSEMs; and 4. the study's methods had to be clearly defined.

3. Results

In this section, the names of the studies retrieved, their methods, and tables of the problems separately experienced by students and teachers are presented.

Studies carried out from 1995, when Science and Arts Centers were first established in Turkey, to September 2022 were examined and a list of the names, types, authors, and years of the studies involving teacher and student problems is shown in Table A1 of Appendix A.

According to Table A1 of Appendix A, there were 46 articles, 15 theses, 1 paper, and 2 books, a total of 64 studies, included in the current study. Studies were coded as S1, S2, S3, etc.

The distribution of the above-mentioned studies across the years is shown in Table 1.

When the distribution of the studies shown in Table 1 is examined, it can be seen that the studies were produced between 2007 and 2022. The highest number of studies seems to have been published in 2019 (f = 13) and there is a trend of increase in studies in recent years.

In Table A2 of Appendix B, information about the research methods employed in the studies is presented. The names of the studies are not shown here; rather, the codes shown in Table A1 of Appendix A are used.

As can be seen in Table A2 of Appendix B, case studies are the most preferred research model, BİLSEM teachers are the most preferred participants, the semi-structured interview form is the most preferred data collection tool, and content analysis is the most preferred method of analysis.

Problems experienced by students and teachers in BİLSEMs were listed separately for students and teachers, and the problems that emerged were grouped into categories. The findings involving student problems are presented in Table 2, and the findings involving teacher problems are presented in Table 3.

Table 1. Distribution of the studies across the years.

Year	n
2022	2
2021	10
2020	9
2019	13
2018	8
2017	4
2016	3
2014	6
2013	3
2012	2
2011	2
2010	1
2007	1

Table 2. Student problems in BİLSEMs.

Category	Problems	f
Arising from themselves or their environment	Being excluded from their circle of friends	7
	Too many expectations for them	6
	Not being well understood and communication problems	6
	Asking too many questions	4
	Insufficient individualization and boredom at school	4
	Misguidance of parents and teachers in career planning	3
	Being active and lack of attention	3
	Being made an example even though they do not want to stand out	2
	BİLSEM does not meet expectations	2
	Being perceived as someone superior at school	2
	Receiving negative reactions from the people around them when their classmates obtain higher grades than them	1
	Families not encouraging their abilities	1
Arising from the program	Insufficient training program	5
	Problems in the process of measurement and evaluation	2
	No foreign language other than English	2
	Not using special publications for BİLSEMs	1
	Overlaps between the activities they want to participate in	1
Arising from the institution	Intensity of the activities and having to participate in too many activities	14
	Insufficient infrastructure and lack of materials	10
	A low number of tenured teachers	7
	Transportation to BİLSEM	4
	Education at BİLSEM is parallel to what is conducted at school	3
	Teachers not using appropriate teaching methods	3
	Inadequate class hours allocated to some lessons and activities	3
	Absence of sports activities	2
	Inadequate opportunities offered to graduate students	2
	Problems in the methods used for diagnostic purposes	2
	Crowded classrooms	2
	Compulsory participation in local and national competitions	1
	Scientific conversations are boring and ineffective	1

Table 3. Teacher problems in BİLSEMs.

Category	Problems	f
Arising from students	Absence of students	12
	Reluctance and low motivation in students	7
	Students being tired	4
	Students' adaptation problems	2
	Students arriving late and timing problems	2
	Students not being able to express themselves	2
	Students' lack of responsibility	2
	Students demanding excessive attention	1
	Students' devaluation of BILSEM	1
	Lack of discipline on the part of the students	1
Arising from the program	The program is not functional or adequate	15
	Problems experienced in the measurement and evaluation process of the program	8
	The program is not up to date	6
	Lack of standards in the objectives of the program	3
	The program is not directed at the students' interests and needs	3
	Lack of interdisciplinary subjects in the program	2
	Lack of elements supporting psychological development in the program	1
	Insufficient activity times in the program	1
	The program is not integrated into formal education	1
Arising from the institution	Shortage of materials, inadequate physical conditions and infrastructure	28
	Insufficient professional development opportunities	16
	Inadequacies in the process of diagnosing students	13
	Too many students and crowded classrooms	12
	Working hours and time	10
	Lack of teachers, particularly tenured teachers	9
	Insufficient financial opportunities, problems with personal rights	8
	Insufficient teacher qualifications	7
	Communication problems with parents	6
	Lack of cooperation with other schools and universities	5
	Poor institutionalization	4
	Being far from the city center	3
	Lack of support by the Directorate of National Education	2
	Insufficient activity books	2
	Too many procedures	2
	Lack of support offered by administrators to teachers	2
	Working with younger age groups	2
	Short break time, program intensity	2
	Communication problems between administrators and teachers	1
	Populist approaches	1
	Difficulty in scheduling workshops	1
	Student progress is not recorded	1

As can be seen from Table 2, student problems in BİLSEMs are divided into three categories: problems arising from themselves and their environment, problems arising from the program, and problems arising from the institution. In the category of problems arising from themselves and their environment (f = 41), the problems of being excluded from their circle of friends (f = 7), too many expectations for them (f = 6), not being well understood and communication problems (f = 6), asking too many questions (f = 4), and insufficient individualization and boredom at school (f = 4) come to the fore. Below are some sample statements from the selected studies regarding the category of problems arising from themselves and their environment.

> "Students stated that they could not find friends in their formal education schools, they were excluded and they had difficulty in communicating." (S54)

> "They look very different in their classroom environment, so they are excluded." (S10)

> "Being in more than one institution creates high expectations. This means too much stress for me." (S15)

> "Problems arise due to high expectations from students." (S22)

> "Gifted children's not being understood well and communication problems." (S22)

> "At school, there is no problem that my daughter has with the people around her, but at home she overwhelms me with her endless questions, I cannot convince. I always try to persuade her by talking to her at home. If it's sixteen hours we're awake at home, I have to talk to her for ten hours." (S56)

> "The problems of the child's being bored or not being academically challenged come to the fore." (S35)

In the category of the problems arising from the program (f = 11), the problems of insufficient training programs (f = 5), problems in the process of measurement and evaluation (f = 2), and no foreign language other than English (f = 2) come to the fore. Below are some sample statements from studies on the problems in the category of problems arising from the program.

> "Limited variety of programs offered. It is not right to apply gifted education in a group by only enhancing the objectives. It can be investigated and seen which system is efficient. Teachers must be highly qualified. Modules should be created and children should be given the right to choose according to their level. Different applications should be researched and tried. There must be differentiation from formal education. Applications should be made to develop higher-order skills in science and arts centres. In addition, the competences of the teachers working in the support classes should be developed. The parallel education model should be used for the child to get to know himself/herself." (S13)

> "In my opinion, the main problem is not the education provided, but the assessment, evaluation and placement processes. On the one hand, we want to develop their creativity and thinking skills. On the other, we evaluate them with tests." (S13)

> "Students should be taught foreign languages other than English and more variety in foreign language should be offered and BİLSEM students should be provided with opportunities to go abroad to learn language." (S22)

> " . . . It was stated that all the activities that students wanted to participate in overlapped and they could not keep up with them." (S52)

In the category of problems arising from the institution (f = 54), the problems of the intensity of the program and having to participate in too many activities (f = 14), insufficient infrastructure and a lack of materials (f = 10), a low number of tenured teachers (f = 7), and transportation to BİLSEM (f = 4) come to the fore. Below are some sample statements from the selected studies regarding the category of problems arising from the institution.

"It is seen that pre-adolescent children appear to have a high level of difficulty participating in too many activities." (S35)

" . . . My weekly schedule is very boring, even the parts I can enjoy are not fun because my schedule is very busy." (S29)

"It is very unlikely that we will do all the activities. The reason for this is the lack of physical facilities and the lack of time. We have a shortage of teaching materials; we have to manage at least two different activities from different branches in the same classroom . . . " (S27)

"There should be more technological training materials." (S16)

"When education starts every year, we, as BİLSEM, start education 2–3 weeks later because every year, new teachers are assigned to our Centre. It is 2–3 weeks late for them to start work. It also takes a long time for our incoming counsellors (teachers) to learn that we are different from the regular school and that they should prepare activities accordingly. Despite this, all our teachers who have come so far have been really diligent. Rather than being a teacher and student, they become like brothers and sisters to us." (S47)

"Our most important problem is the distance of the institution and the insufficient conditions in the building. Each branch must have a separate workshop, parents provide transportation to school under difficult conditions, there are problems while waiting for students, the institution also needs to be developed in terms of equipment. Our biggest problem is the school building and its location." (S27)

"Transportation support can be provided to students. Let the parents pay the fee again, but the service that can take the children from their school to BİLSEM is required." (S46)

"Sports events should be organized; venues for various sports, facilities, perhaps extensive sports halls should be built." (S22)

As can be seen from Table 3, teacher problems in BİLSEMs are divided into three categories: problems arising from students, problems arising from the program, and problems arising from the institution. In the category of problems arising from students (f = 34), the problems of the absence of students (f = 12), reluctance and low motivation in students (f = 7), and students being tired (f = 4) come to the fore. Below are some sample statements from the selected studies regarding teacher problems in the category of problems arising from students.

"There are students who are absent. In addition, there are students who come with the pressure of their families. We have a problem of absenteeism, especially among high school students. As the grade level increases in BİLSEM, absenteeism increases, as well. Students have problems fulfilling their responsibilities." (S14)

"The intensity of students' programs in formal education institutions, extra study hours in these programs overlapping with the study hours to be spent in the Bilsem program, the full-time education in our province cause absenteeism." (S64)

"Students are indifferent. They see themselves as knowing everything but some of them are highly inadequate. They are not interested in activities. Some come because of the pressure of the family." (S14)

"Students are tired. Students who come to BİLSEM after school are naturally tired because they have been studying for seven hours at school; this tiredness is both physical and mental. They come here hungry and they cannot eat anything until they go home." (S37)

"The pressure they experience due to high expectations from them reduces their efficiency in activities. They have problems in adaptation." (S40)

"Students can demand excessive attention. Children who do well and receive attention in their regular schools expect the same attention here." (S37)

In the category of problems arising from students in BİLSEMs (f = 40), the problems of the programs not being functional and adequate (f = 15), problems experienced in the measurement and evaluation process of the program (f = 8), and the programs not being up to date (f = 6) come to the fore. Below are some sample statements from the selected studies regarding the teacher problems in the category of problems arising from the program.

"The objectives do not seem very sufficient for gifted students. Although the objectives do not seem sufficient for the knowledge level of gifted students, they are placed in a way that can be taken to the upper level." (S12)

"No. If the program is implemented word for word, I don't think the objectives have been achieved. They can never learn scientific research skills." (S28)

"14.29% of the teachers expressed a negative opinion about the content of the BİLSEM exam. It is the opinions in this category that process-oriented evaluation should be made and creativity should be measured." (S33)

"Structural problems. Integration to formal education. Lack of measurement and evaluation." (S6)

"The program should be updated on the basis of standard objectives having international validity." (S12)

" . . . I definitely think that the subjects should be addressed in an interdisciplinary model. The same subject should be taught by three different branch teachers at the same time. In this way, their multidimensional thinking skills can be developed." (S11)

In the category of problems arising from the institution in BİLSEMs (f = 139), the problems of a shortage of materials, inadequate physical conditions and infrastructure (f = 28), insufficient professional development opportunities (f = 16), inadequacies in the process of diagnosing students (f = 13), too many students and crowded classrooms (f = 12), and working hours and time (f = 10) come to the fore. Below are some sample statements from the selected studies regarding teacher problems in the category of problems arising from the institution.

"We do not have enough materials. We do not have a designated classroom, we use any room we find empty. The conditions are not very comfortable for students." (S30)

"There is a lack of in-service training. Especially novice teachers do not know what to do. They have difficulty in adapting to the centre." (S64)

"The inventory used to diagnose gifted children is insufficient." (S58)

"At the end of a week of course training, students should be taken to music diagnosis, which can reveal their creativity more clearly. I think that the diagnosis alone is not enough, and it is necessary to make diagnoses that measure creativity, ability to conduct musical research and to take initiative and participation." (S27)

"Groups are crowded. Students constantly change groups for various excuses, which negatively affects group synergy." (S17)

"While working in formal education institutions, we experience difficulties in adaptation when we move to Science and Arts centres. When everyone goes to class (school), Bilsem teachers work at home, and on Saturdays and in evenings when everyone is at home, we work. This might create problems while we are planning our lives." (S14)

"Teachers should be relieved economically, they should not have the thought of how to bring the end of the month, the morale and motivation of teachers should be kept high so that the negativities are not reflected on their students." (S59)

> "Teachers' personal rights are limited due to the lack of a regulation on science and arts centres." (S58)

> "Teachers assigned to the institution from other schools are not efficient because they do not have knowledge of the institution. Since they are temporary and they know that they will leave, they do not contribute to the development of the institution and they see such tasks as extra burden. I think all the teachers working here should be permanent and tenured teachers." (S54)

> "The lack of cooperation between BİLSEMs and the ministry's inability to provide the necessary coordination cause differences between BİLSEMs. Provincial and district directorates of national education do not pay due attention to BİLSEMs and they remain as forgotten institutions. While BİLSEMs should organize frequent trips, observations and activities, the lack of cooperation with institutions such as governorships and universities is another problem in BİLSEMs." (S37)

4. Discussion and Conclusions

In the current study, the problems experienced by teachers working in Science and Arts Centers and students attending these centers were examined through the analysis of studies focused on Science and Arts Centers. At the end of the study, the problems experienced by students and teachers were categorized and presented separately. First, the problems experienced by students were divided into three categories: problems arising from themselves and their environment, problems arising from the program, and problems arising from the institution. The problems were listed in each category. Then, the problems experienced by teachers were also divided into three categories: problems arising from students, problems arising from the program, and problems arising from the institution. The problems were also listed in each category.

In the category of student problems arising from themselves and their environment, the problems of being excluded from their circle of friends, too many expectations for them, and not being well understood and communication problems came to the fore. In the category of student problems arising from the program, the problems of insufficient training programs, problems in the process of measurement and evaluation, and no foreign language other than English came to the fore. Finally, in the category of student problems arising from the institution, the problems of the intensity of the activities and having to participate in too many activities, insufficient infrastructure and a lack of materials, and the low number of tenured teachers came to the fore.

In the study of Akbüber, Erdik, Güney, Çimşitoğlu, and Akbüber [33], the Special Talented Student Workshop, which was held with 168 students from 48 provinces of Turkey, was discussed. In the workshop, problems arising from the high expectations from the students, the high pace, the problems in friendship relations, and the lack of permanent teachers, which support the present research, were expressed. Again supporting our research, in the study conducted by Sarı and Öğülmüş [34] on the problems encountered in Science and Arts Centers, it was revealed that the students had a busy schedule and they had problems harmonizing with their peers. Epçaçan and Oral [35] also stated that students experience absenteeism at BİLSEMs due to exam anxiety and fatigue. In a study conducted in the USA, it was determined that the environment of compassion, support, and respect provided to gifted individuals is important for the development of these individuals' skills, competence, and peer relations [36]. In a study conducted in schools in two federal states of Germany, it was determined that gifted children establish better social relations and show more interest in school in environments adapted to their abilities and intelligence [37]. Buescher and Higham [38] stated that the expectations for gifted students are high and they become tired from their considerable efforts to meet these expectations. According to the findings of a study conducted in the USA, the parents of academically gifted children are completely focused on academic success, the perfectionist attitudes of the parents enable the children to set high goals, and the high expectations of the parents negatively affect the gifted children [39]. According to the results of a study conducted in Israel that gifted

students studying in special classes have lower academic self-esteem and higher anxiety about being evaluated by others than their normal peers, the "psychological support of gifted students" is of critical importance [40]. In a study conducted by Van-Tassel Baska [41], it was revealed that the curriculum of gifted students should consist of comprehensive concepts, themes, and problems and that interdisciplinary issues should be included in specific topics.

On the other hand, in the category of teacher problems arising from students, the problems of the absence of students, the reluctance and low motivation of students, and students being tired came to the fore. In the category of teacher problems arising from the program, the problems of the programs not being functional or adequate, problems experienced in the measurement and evaluation process of the program, and the programs not being up to date came to the fore. Finally, in the category of teacher problems arising from the institution, the problems of a shortage of materials, inadequate physical conditions and infrastructure, insufficient professional development opportunities, inadequacies in the process of diagnosing students, too many students and crowded classrooms, working hours and time, insufficient financial opportunities, problems in personal rights, and a lack of teachers, particularly tenured teachers, came to the fore.

In the study by Bozan and Savi Çakar [42], in which they revealed the problems of teachers working at BİLSEMs, teachers continuously state that the course hours in Science and Arts Centers are not suitable for both teachers and students. The most frequently mentioned problems by the teachers, from an educational sense, are the lack of equipment and materials in the center they work at, the insufficient physical equipment of the centers, and the content of the activities included in the framework programs of the Science and Arts Centers, which supports the present research. Again in support of this research, in Şenol's [43] master's thesis, in which the views of teachers on the education program of gifted students were obtained, it was stated that the majority of teachers faced problems with the physical environmental conditions of Science and Arts Centers. In a study conducted in two counties in the US state of Virginia, it was concluded that teachers who received training for mentally gifted children (85.5%) were more successful in recognizing gifted children than teachers who did not receive training (40.3%) [44]. In a study conducted with 212 primary school teachers from six regions of Finland, it was determined that nearly half of the teachers did not receive any training on gifted student education, although 82% of them were willing to receive training on this subject [45].

A total of one hundred and two problems for students (f = 106) and two hundred and two problems for teachers (f = 213) emerged in the studies, together with the recurring problems. Since the opening of the first Science and Art Center in Turkey in 1995, both the number of BİLSEMs and the number of students and teachers attending BİLSEMs have continued to increase. In fact, this increase has accelerated even more in recent years. In the news on the website of the Ministry of National Education, Minister Özer said that "While the number of BİLSEM was 183 in 81 provinces, we increased this number to 225 by the end of 2021. Our target in 2022 is to open 125 new BİLSEMs and increase the number to 350" [46]. With this numerical increase in BİLSEMs, it is seen that the problems are also increasing and waiting for a solution.

According to the formal education statistics of the Ministry of National Education published annually, the number of students attending formal education is 18085943, the number of teachers is 1112305, and the total number of schools is 67125 [47]. When it comes to BİLSEMs, it is stated in the news published on the website of the Ministry of National Education that these numbers are approximately 63,000 students, 2223 teachers, and a total of 225 BİLSEMs [48]. Based on this numerical information, when formal education is compared with Science and Arts Centers, it can be said that 0.35% of all the students in formal education attend BILSEMs, 0.20% of all the teachers in formal education work in BILSEMs, and 0.36% of all the schools in formal education are allocated to BILSEMs. As can be seen from these figures, all Science and Arts Centers do not constitute even one percent of formal education. In the Science and Arts Directive of the Ministry of National

Education, one of the aims of Science and Arts Centers is defined as: "To train individuals who adopt, protect and develop the national, moral, humanitarian, spiritual and cultural values of the country, have the power of free and scientific thinking and a broad world view and can contribute to the development of the country as constructive and creative individuals" [49]. Gifted students are seen as the future of countries, and it is evident that all investments in them will be added value for humanity in the future [50]. While it is good news that the numerical figures related to BİLSEMs increase with each year, it is worrying that, although they constitute a very small portion of formal education institutions, they have to deal with many problems every year. Of course, wherever there are people, it is inevitable that there will be problems. However, it may be possible to eliminate some problems (physical conditions, transportation, etc.) with small initiatives. It is believed that the problems put forward with a holistic perspective in this study will be taken into account and resolved by the authorities in solving the problems in BİLSEMs.

5. Suggestions

1. In order for BİLSEMs to fulfill their functions, first of all, it is necessary to improve their physical equipment, eliminate the deficiencies of equipment and materials, and solve the problem of teacher shortages.
2. The problems experienced by students and teachers in Science and Arts Centers should be taken into account and resolved by authorities.
3. Different dimensions, other than students and teachers, can be addressed and studied regarding the problems experienced in Science and Arts Centers.
4. More in-depth studies, such as meta-syntheses, can be carried out for the problems experienced in Science and Arts Centers.
5. A needs analysis of the curricula followed in Science and Arts Centers can be conducted in relation to the problems that were presented in the current study.

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Appendix A

Table A1. Numbers, names, types, and years of the studies focused on the problems experienced by students and teachers in BİLSEMs.

Code	Name of the Study	Type	Author(s)	Year
S1	Investigation of the Problems of Music Unit Students Studying at Science and Art Centers (BİLSEM)	Book	S. Çiloğlu, D. B. Çevik Kılıç	2022
S2	Opinions of Music Teachers Working in BİLSEMs on Instrument Education of Gifted Children	Master's Thesis	Ç. Karagün	2022
S3	Factors Affecting the Success of Education Reform: Analysis of the BİLSEM Model in the Context of Policy Attributes Theory	Analysis	B. Yakut Özek	2021

Table A1. *Cont.*

Code	Name of the Study	Type	Author(s)	Year
S4	Evaluation of the Support Education Program Prepared for Gifted Students	Article	M. Polat, İ. Polat	2021
S5	BİLSEM History Teachers' Workshop Preparation Experiences	Article	O. Akhan, S. Altaş	2021
S6	Opinions of BİLSEM History Teachers About the Working Conditions in BİLSEM	Article	O. Akhan, S. Altaş	2021
S7	Teacher Opinions on Science and Arts Centres Social Studies Curriculum	Article	H. Bolat, F. Karakuş	2021
S8	Gifted Children from the Perspective of Their Parents	Article	H. Demirkaya, O. Ünal, İ. Bozan	2021
S9	Comparison of Class Levels According to Expert Opinions in the Diagnosis of Gifted Students	Article	A. Eker, H. Sarı	2021
S10	Longitudinal Evaluation of the Education Given in Science and Arts Centres According to Family Views	Article	N. Büyüktokatlı, A. Kurnaz	2021
S11	Criticism of the Education Provided in BİLSEMs from the Perspective of Administrators and Teachers	Article	M. Yılmaz, T. Yılmaz	2021
S12	Analysis of Science and Arts Centres English Curriculum Based on Teachers' Views	Article	H. Torunoğlu, M. Ünal, E. Karabay	2021
S13	Opinions of Faculty Members on the Use of Distance Education in the Education of Gifted Students	Article	M. Alpaslan	2020
S14	Determination of the Problems Experienced by Science and Arts Centre Teachers and Suggestions for Solutions to These Problems	Article	İ. Bozan, F.S. Çakar	2020
S15	A Riddle for Gifted Students: Being in More than One Educational Institution	Article	F. Bahçeci, U. Epçaçan	2020
S16	Investigation of the Opinions of Gifted Students on Chemistry Lesson: Case of Erzurum BİLSEM	Article	T. Başar Daz, Z. Karagölge, İ. Ceyhun	2020
S17	Turkish Education Problems For Gifted Students and Solution Suggestions	Article	C. Şahin	2020
S18	Investigation of the Creative Writing Skill Levels of Gifted Students	Article	B. Özcan, H. Kontaş, M. Polat	2020
S19	Evaluation of Intelligence Tests Used in BİLSEM Diagnostic Process According to the Opinions of Psychological Counsellors and BİLSEM Teachers	Article	A. Kurnaz, S. Gökdemir Ekici	2020
S20	Views of Students, Teachers and Administrators on BİLSEM Education Programs in the Context of Values Education	Master's Thesis	S. Orman	2020
S21	Examining the Problems Experienced by Mathematics Teachers Working in BİLSEMs in Mathematics Education	Master's Thesis	G. Su	2020
S22	A Method Proposal for the Evaluation of the Problems of Gifted Students in Science and Arts Centres "Gifted Students Workshop"	Article	B. A. Akbürer, E. Erdik, H. Güney, G. G. Çimşitoğlu, C. Akbürer	2019
S23	Opinions of Gifted Students on Teaching Practices in BİLSEMs	Article	U. Epçaçan, B. Oral	2019
S24	Opinions of Gifted Students on the Scientific Conversations Held in the Science and Arts Centres	Article	D. Girgin, İ. Satmaz	2019
S25	Evaluation of the Opinions of Teachers Working in the Education of Gifted Students on Preparing Individualized Education Programs, Implementing and Monitoring Them	Article	S.S. Ilik	2019
S26	Turkish Education for Gifted Students in Science and Arts Centres: A Case Study	Doctoral Dissertation	O. Alevli	2019
S27	The Efficiency of Science and Arts Centres in the Education of Gifted Students	Master's Thesis	G. Akın	2019
S28	Investigation of Science and Arts Centres Support Education Program According to Classroom Teachers' Views	Master's Thesis	A. Ertürk	2019
S29	A Study on the Weekly Program of Gifted and Talented Children Who Will Shape Our Future	Paper	A. Yaşar Pırtı, M. Taşçı	2019
S30	Opinions of School Administrators and Teachers on the Education Provided in the Support Room for Gifted Students	Article	K. Pemik, F. Levent	2019
S31	Opinions of Visual Arts Teachers Working in Science and Arts Centres on Arts Education of Gifted Students	Article	F. Levent, F. Kansu Çelik	2019
S32	Evaluation of Education Programs of Science and Arts Centres Based on Student Views	Article	E. Kayışdağ, M. A. Melekoğlu	2019
S33	Determination of the Attitudes and Opinions of Classroom Teachers on the Education of Gifted and Talented Students	Article	N. G. Kaya	2019
S34	The Role of Science and Arts Centres in the Education of Gifted Students: Teacher and Parent Opinions	Master's Thesis	S. A. Sarıay	2019
S35	Psychological Counselling and Guidance Needs of Gifted Students in Turkey	Article	F. Altun, H. Yazıcı	2018
S36	Adapting the Problem Screening Inventory for Gifted Students to Turkish Culture	Article	F. Altun, H. Yazıcı	2018
S37	Problems Encountered by Mathematics Teachers Working in Science and Arts Centres	Article	A. Çetin, A. Doğan	2018
S38	The Opinions of Science and Arts Centre Administrators on the Challenges and Solutions: The Case of Istanbul	Master's Thesis	G. S. Çoban	2018
S39	Examining Computational Thinking Skills of Gifted Students	Article	S. Kirmit, İ. Dönmez, H. E. Çataltaş	2018
S40	Problems Experienced by Science and Arts Centre Teachers in the Education Process and Student Orientation	Article	G. Batdal Karaduman, A. Elgün Ceviz	2018
S41	The Role of Science and Arts Centres in the Turkish Education System	Article	B. Kuyumcuoğlu	2018
S42	The Effect of Biology Project Studies on the Scientific Attitudes of Gifted and Talented Students	Article	M. Özarslan	2018

Table A1. *Cont.*

Code	Name of the Study	Type	Author(s)	Year
S43	Investigation of the Opinions of Turkish Teachers Working in Science and Arts Centres on the Individualized Education Plan	Article	M. Ateş	2017
S44	Differences and Problems in Turkish Lesson Practices in Science and Arts Centres Individualized Education Program	Article	B. Bağcı Ayrancı, F. Mete	2017
S45	Evaluation of the Diagnosis Process of Gifted Students in Our Country According to the Opinions of Teachers, Parents and Students	Master's Thesis	S. Gökdemir	2017
S46	The Problem of Absenteeism of Science and Arts Centre Students	Book	H. Demirtaş, A. Culha	2017
S47	Student Opinions on the Sustainability of Gifted Education in Science and Arts Centres	Article	H. Atlı, R. Balay	2016
S48	Opinions of Classroom Teachers Working with Gifted/Talented Students in Support Education Rooms on This Application	Article	H. S. Tortop, S. Dinçer	2016
S49	In-Service Training Problem of Teachers Assigned to Science and Arts Centres	Article	İ. Satmaz, İ. E. Gencel	2016
S50	The Difficulties Encountered by the Parents of Gifted Children Attending the Science and Arts Centre (BİLSEM) (Case of Sakarya Province)	Master's Thesis	Ş. Çamdeviren	2014
S51	Science Education Programs Implemented in Science and Arts Centres from the Perspectives of Administrators, Teachers and Students	Article	B. B. Ülger, S. Uçar, İ. Özgür	2014
S52	Examination of Science and Arts Centre Students' Views on These Institutions	Article	Ç. Çelik Şahin	2014
S53	Investigation of Opinions on the Setting of Standards in Science and Arts Centres in Turkey	Article	M. S. Summak, Ç. Çelik Şahin	2014
S54	Evaluation of the Problems Encountered in Science and Arts Centres (BİLSEMs) on the Basis of Teacher and Student Views	Article	H. Sarı, K. Öğülmüş	2014
S55	Evaluation of Science and Arts Centres in their Twentieth Anniversary Based on Reports and Administrators' Views	Article	A. Kurnaz	2014
S56	The Differences Parents See in their Students Going to the Science and Art Centre (BİLSEM)	Article	A. Alkan	2013
S57	Evaluation of Interdisciplinary Teaching Activities in Visual Arts Education of Gifted Students (Case of Konya BİLSEM)	Doctoral Dissertation	M. A. Genç	2013
S58	Science and Arts Centres: Current Situations, Problems and Solution Suggestions	Article	M. Özer Keskin, N. Keskin Samancı, S. Aydın	2013
S59	Evaluation of the Opinions of Teachers and Administrators Working in the Science and Arts Centre (BİLSEM) on Professional Development and School Development	Article	T. Altun, S. Vural	2012
S60	Teachers' Opinions on Gifted Education Programs (Case of BİLSEM)	Article	İ. Y. Kazu, C. Şenol	2012
S61	Evaluation of the Education Programs of the Science and Art Centre with the Hammond Model	Doctoral Dissertation	Y. Eser	2011
S62	Teachers' Opinions on Gifted Education Programs (Case of BİLSEM)	Master's Thesis	C. Şenol	2011
S63	A Study on Science and Art Centres (BİLSEMs), a Model in the Education of the Gifted	Master's Thesis	H. Yıldız	2010
S64	Evaluation of Science and Arts Centre Application	Master's Thesis	B. Sezginsoy	2007

Appendix B

Table A2. Methods of the studies focused on the problems experienced by students and teachers in BİLSEMs.

Code	Model	Sample/Study Group	Data Collection Tool	Data Analysis
S1	Descriptive	10 students in BİLSEMs	Open-ended questions	Descriptive analysis
S2	Case study	10 BİLSEM music teachers	Semi-structured interview form	Content analysis
S3	Case study	5 administrators and 10 teachers working in BİLSEMs	Semi-structured interview form	Theoretical thematic analysis
S4	Phenomenology	7 teachers and 10 students in BİLSEMs	Semi-structured interview form, support program evaluation teacher questionnaire	Content analysis
S5	Descriptive	72 BİLSEM history teachers	Semi-structured, open-ended questions	Content analysis
S6	Descriptive	27 BİLSEM history teachers	Semi-structured, open-ended questions	Content analysis
S7	Nested design	77 BİLSEM social studies teachers	BİLSEM social studies curriculum evaluation questionnaire, semi-structured interview form	Descriptive statistics, content analysis
S8	Case study	25 students in BİLSEMs and their parents	Semi-structured interview form	Content analysis
S9	Semi-structured interview technique	30 experts working in Guidance Research Center	Semi-structured interview form	Content analysis
S10	Survey	Parents of 78 students in BİLSEMs	Interview form	Content analysis
S11	Case study	5 administrators and 10 teachers working in BİLSEMs	Semi-structured, open-ended questions	Content analysis

Table A2. *Cont.*

Code	Model	Sample/Study Group	Data Collection Tool	Data Analysis
S12	Case study	12 English teachers	Interview	Content analysis
S13	Case study	Faculty members of the Gifted Education Department	Semi-structured interview form	Content analysis
S14	Case study	30 BİLSEM teachers	Semi-structured interview form	Content analysis
S15	Case study	11 students in BİLSEMs	Semi-structured interview form	Content analysis
S16	Case study	23 students in BİLSEMs	Semi-structured interview form	Content analysis
S17	Case study	14 different Turkish teachers from 14 different BİLSEMs	Interview	Content analysis
S18	Causal comparative	85 students attending BİLSEMs	Creative writing activities	Descriptive statistics
S19	Case study	18 BİLSEM teachers and 19 counsellors	Interview	Descriptive statistics, content analysis
S20	Phenomenology	17 teachers, 19 students, and 5 administrators from BİLSEMs	Semi-structured interview form	Content analysis
S21	Phenomenology	13 mathematics teachers working in BİLSEMs	Interview	Descriptive analysis
S22	Case study	168 students attending BİLSEMs	Interview and document analysis	Descriptive analysis
S23	Case study	56 students in BİLSEMs	Semi-structured interview form	Content analysis
S24	Phenomenology	42 students in BİLSEMs	Semi-structured interview form	Content analysis
S25	Case study	22 BİLSEM teachers	Semi-structured interview form	Descriptive analysis
S26	Case study	19 teachers, 29 students, and 19 parents from BİLSEMs	Semi-structured interview form, semi-structured observation form, reflective student diaries and documents	Content analysis and descriptive analysis
S27	System approach	23 students, 25 teachers, and 30 parents from BİLSEMs	Semi-structured interview form, observation	Content analysis and descriptive analysis
S28	Survey, case study	158 BİLSEM classroom teachers	Support education program evaluation questionnaire, semi-structured interview form	Descriptive analysis, basic level analysis, and content analysis
S29	Focus group interview technique	20 students in BİLSEMs	Interview form	Descriptive analysis
S30	Phenomenology	20 administrators and 19 teachers working in primary and middle schools	Semi-structured interview	Content analysis
S31	Case study	12 visual arts teachers working in BİLSEMs	Interview	Content analysis
S32	Survey	600 students attending BİLSEMs	Scale	Descriptive analysis
S33	Descriptive survey	220 classroom teachers in Ankara	Personal information form, attitude scale	Descriptive analysis, content analysis
S34	Content analysis	32 teachers working in BİLSEMs and 71 parents	Personal information form, open-ended question form	Content analysis
S35	Cross-sectional survey	Parents of 606 students attending BİLSEMs	Information form, problem screening inventory for gifted students (ÜY-PTE)	Descriptive statistics
S36	Not specified	Parents of 242 students attending BİLSEMs	Information form, problem screening inventory for gifted students	Descriptive statistics
S37	Phenomenology	13 BİLSEM mathematics teachers	Written interview form	Content analysis
S38	Nested single-case design	8 BİLSEM principals	Interview form	Content analysis
S39	Relational survey	59 students attending BİLSEMs	Scale	Descriptive analysis
S40	Case study	16 teachers working in BİLSEMs	Interview	Content analysis
S41	Semi-structured interview	Teachers, students, and parents in BİLSEMs located in Karşıyaka and Narlıdere	Interview	Content analysis
S42	Qualitative and quantitative and experimental	46 students in a biology program	Attitude scale, semi-structured interview	Descriptive analysis
S43	Interview technique	19 BİLSEM Turkish teachers	Structured interview form	Descriptive analysis
S44	Document analysis, interview method	10 BİLSEM Turkish and literature teachers	Semi-structured interview form	Content analysis
S45	Case study	228 teachers, students, and parents in BİLSEMs	Structured interview form	Descriptive analysis and content analysis
S46	Case study	2 administrators, 7 teachers, 7 students, and 8 parents in BİLSEMs	Semi-structured interview form	Content analysis
S47	Interview technique	22 students attending BİLSEMs	Semi-structured interview form	Content analysis
S48	Case study	15 classroom teachers working in BİLSEMs	Semi-structured interview	Content analysis

Table A2. *Cont.*

Code	Model	Sample/Study Group	Data Collection Tool	Data Analysis
S49	Phenomenology	30 teachers working in BİLSEMs	Semi-structured interview	Content analysis
S50	Content analysis technique	Parents of 108 students attending BİLSEMs	Open-ended questions	Content analysis
S51	Case study	6 teachers and 5 administrators working in BİLSEMs and 10 students	Interview	Content analysis
S52	Qualitative	4th-grade and 5th-grade students attending Adana and Mersin BİLSEMs	Open-ended question form	Content analysis
S53	Qualitative	3 academicians, 3 administrators, 3 teachers, and 3 parents	Interview	Content analysis
S54	Semi-structured interview	Teachers and students invited to the 1st National Child Congress	Semi-structured interview	Content analysis
S55	Case study	32 BILSEM principals	Interview and document analysis	Descriptive analysis
S56	Interview technique	Parents of 7 students attending BİLSEMs	Semi-structured interview form	Descriptive analysis
S57	Single-group quasi-experimental design	17 students attending BİLSEMs	Teacher as an observer interview form, student reflection form, student interview form, expert evaluation form	Content analysis and descriptive analysis
S58	Survey	Administrators and students in the selected BİLSEMs	Questionnaire, semi-structured interview	Descriptive statistics
S59	Phenomenography	20 BİLSEM teachers	Semi-structured interview technique	Continuous comparison analysis method
S60	Survey	24 teachers working in BİLSEMs	Questionnaire	Descriptive analysis
S61	Survey	BİLSEM teachers, administrators, students, and parents	Questionnaire	Descriptive statistics
S62	Survey	318 teachers working in BİLSEMs	Questionnaire	Descriptive statistics
S63	Descriptive survey	170 teachers working in BİLSEMs, 269 students, and 238 parents	Scale	Descriptive statistics
S64	Survey	25 teachers working in BİLSEMs	Scale	Descriptive statistics

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