Journal of Gifted Education and Creativity
11(1), 23-35, March 2024
e-ISSN: 2149- 1410
jgedc.org dergipark.org.tr/jgedc

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Review Article

Gifted education in Turkiye from the perspectives on Science and Art Centers (SAC)[1] : issues and suggestions

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Article Info

Received: 7 February 2024
Accepted: 30 March 2024
Online: 30 March 2024

Keywords
Education models for gifted
Gifted
Gifted education in Turkiye
Gifted student
SACs

Abstract

There are substantial expectations from gifted students while countries design the framework of their long-term programs. In this sense, developing countries like Turkey tend to comprehensive investments in gifted education. However, there is still no comprehensive content related to this field that boosts gifted student talents significantly, especially in science education. In this respect, it is crucial to develop inclusive content that can fully satisfy the needs of these students. In this direction, SACs were established in 1995 to bring to life practice-based education for special students in three domains: painting, music, and general talent. Training is carried out in four stages; resource education, recognizing individual talents, enhancing special talents, and project-based programs. These stages proceed in parallel with the student's grade level. In-course applications are provided to students in the form of small-group studies. Despite satisfying gains, there is a risk that these institutions are gradually losing ground and turning into ordinary formal education institutions parallel to their increasing prevalence. It is important to renovate these institutions, which each administration shapes within the framework of its perspective, by presenting a comprehensive vision. Since it is not fully determined the essence of why SACs were established and the ultimate goal of these institutions, they are currently oscillating between being closed and being developed. In this context, a review study was carried out on certain controversial issues and the aim was to express the basic deficiencies in these institutions from the perspective of a SAC teacher. Within the scope of this study, the problem areas are summarized under five frames; diagnosis, teacher, student, content, and institution. Additionally, some suggestions are introduced and an educational model is described to inform policymakers.

To cite this article:

Paçacı, Ç. (2024). Gifted education in Turkiye from the perspectives on Science and Art Centers (SAC) : issues and suggestions. *Journal of Gifted Education and Creativity, 11*(1), 23-35. DOI: https://doi.org/10.5281/zenodo.

Introduction

Science and Art Centers (SACs) are firstly established in Ankara in 1995 to provide supplementary education to talented students. These institutions have been formed by the 3rd paragraph of the 8th article of the 1739 National Education Basic Law, "Special measures are taken to raise children in need of special education and protection". These institutions are official institutions affiliated with the Ministry of Education that contribute to especially talented students outside of formal education, from the second grade until they finish their high school education. Today, more than 75.000 students receive education in a total of 379 SACs in every city and many districts.

Students are placed through a 3-stage process as a result of diagnosis, intelligence test, and interview. Students have the right to pursue their education until the end of the 12th grade. In these institutions, the content is applied theoretically and practically. Course coordinators make updates every year to enhance the content. These coordinators

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are selected within the SAC teachers and have completed their academic postgraduate education. They both work in the institution, coordinate the studies, and try to update the programs annually.

SACs are very significant centers for hands-on applications that students donot perform during their formal education period. The primary aim is not to teach theoretical knowledge but to provide them with a wider scientific vision. Students are trained in four stages, respectively: resource education training (RET), individual talent recognition program (ITRP), special talents development program (STDP), and project-production and management program. In these programs, while students are theoretically expected to carry out certain studies, in practice they are carried out in parallel with the grade level. In resource education classes, they take manual dexterity courses, English, and informatics lessons. At ITRP, they learn basic course contents such as Science, Turkish, social studies, Maths, and technology design, and at STDP, they learn specialized course contents such as Physics, Chemistry, Biology, History, Literature, informatics, Maths, and aircraft technologies. At the project level, students are expected to do project studies. Every year, a significant number of willing students participate in projects such as TÜBİTAK, Teknofest, e-Twinning, and ERASMUS. In addition, patent, utility models, and design studies are also carried out. Compared to other institutions, teachers have more practice time, they do not have to spend time for exam preparation and evaluation, they do not prepare students for LGS or YKS exams, they do not have a curriculum to complete, and they can implement projects with activity-based education. Students come to these institutions during their remaining time from their schools. In this sense, course do in the evenings and on weekends. It is more accurate to view these institutions not as institutions where gifted students receive education, but as institutions that provide environments where successful students can do extracurricular scientific work.

In addition to all these gains, the risk that these institutions are gradually losing ground, that they will turn into ordinary formal schools as a result of their increasing prevalence, and that the diagnostic exam will turn into an achievement exam, carries the debate to the present day that these institutions are now educating lower profile students. However, these institutions, which have serious problems in terms of implementation, have not yet achieved the desired efficiency. In addition to all this, when we look at the practices in the world, the process of identifying gifted individuals is still a serious problem area. However, it is thought that the educational contents applied are extremely inadequate and cannot adequately support these students. It is argued that graduated students not the expected level and that there is no field where they can directly use their gains. Especially developing countries such as Saudi Arabia, Qatar, China, Indonesia, and Brazil tend to invest more in this field than other countries. Our country is one of the countries that has made the most serious investments in the world in this field. Currently, SACs have reached a significant point in number and these institutions have serious problem areas.

Possible problematic issues encountered in SACs

This is a review study that aims to disclose the possible controversial issues on the SACs. Since these students are specifically identified, the Ministry of Education is careful not to share data with the public. Thus, we do not have sufficient and up-to-date statistical data about these institutions. Although the problem areas revealed below are common to all SACs, each SAC also has specific issues related to the field. In addition, many suggestions and limitations can be discussed, but primarily, a comprehensive framework is aimed to draw for the scope of the study.

Problems with defining of the term gifted student

One of the most controversial issue in SACs is the theoretical and practice-based inconsistencies brought by the term "gifted student" which also affects every process, including education and student selection. This term causes to raise questions about how much the applied tests, and educational content appeal to these students and the observation made by the classroom teachers in their proposal process. Researches imply that gifted individual identification is a really difficult process, that this definition is related to environment, culture, and time, and therefore the definitions and diagnosis methods are not consistent with each other (Freeman, 1979; Pfeiffer, 2003). The American National Association for the Gifted and Talented (2010) defines gifted individuals as individuals with high achievement abilities

in a specific academic field or areas such as intellectual, creative, artistic, and leadership capacity. Contrary to what is thought, these individuals have better social adaptation capacity than other individuals and they comply with social norms more (Bracken & Brown, 2006; Sumpter & Sternevik, 2013).

Although gifted individuals have many aspects, IQ tests are primarily highlighted (Phelps et al., 2023). Generally, a grouping as in Table 1 is made in the literature. This grouping has been seriously criticized in the literature because it limits individuals' capacities only to IQ tests (Gallagher, 2008; Hampshire et al., 2012; Setiawan & Septiarti, 2018). However, Callahan et al. (2017) emphasize that gifted individuals do not only have academic success alone, but the individual must also have an intellectual aspect along with this feature. Hodges et al. (2018) have performed a comprehensive meta-analysis study to underline the issue that IQ tests do not give comprehensive knowledge about giftedness.

Table 1. Grouping of gifted people (Bakioğlu & Levent, 2013)

Level	Intelligence scale	Prevalence Rate
Mindly gifted	115-129	1:40
Moderately gifted	130-144	1:40 – 1:1000
Highly gifted	145-159	1:10.000
Exceptionally gifted	160-179	1:10.000 – 1:1 million
Profoundly gifted	180<	Less than 1:1 million

Problems with the diagnosis process

The student diagnosis process, which has evolved in various ways until today, currently takes place in three steps. Initially, it begins with the proposal of the classroom teachers in the first grade. This process is executed by school guidance commissions. The classroom teachers have the right to propose up to 20% of the students at each grade level. In fact, this is a diagnostic process and a major problem area. In this process, it is very difficult for classroom teachers to reliably identify gifted students. Şahin and Çetinkaya (2015) concluded that there are serious differences in definition between teachers who received training on this subject and teachers who did not during the proposal process. Therefore, it is not sensible to accept the proposing process as a reliable application.

The diagnostic method must be up-to-date and compatible with the curriculum (Kurnaz & Ekici, 2020). But, it was not practicle to use the IQ tests that was not reflect our curriculum and social norms (Sak & Shaughnessy, 2020). Starting in 2019, the Anadolu-Sak Intelligence Scale (ASIS) intelligence test, developed by the UYEP Center research team with the support of Anadolu University and the Ministry of National Education of Turkiye (MoNET), is applied to the proposed students. This test is an IQ test with proven validity and reliability (Köprü & Ayaş, 2020; Tamul et al., 2020). The test, which was conducted on approximately 7000 samples for the 4-12 age group, includes visual and verbal questions and consists of seven subtests (Sak & Shaughnessy, 2020). This test appeals to a very large group and thousands of students take this test every year. For this reason, it is repeated a lot and its validity decreases as its prevalence increases, but a comprehensive study has not yet been conducted in this field. This situation is seen observed more clearly in exam results. In other words, as the grade level increases, the SAC placement rate also increases. According to 2019 MEB data, 20,263 students were entitled to be placed in the centers. Eventhough the number of student at each grade very close, the number of student that got enough point was 4,414 in 1st-grade, 7,299 in 2nd-grade, and 8,550 in 3rd-grade (URL-3). Therefore, more students get sufficient scores every year. Students who score above the annually determined threshold in this test are eligible to enter the interview. The interview process is carried out by the Guidance and Research Center. Students are presented with a series of theoretical and practical situations that they are expected to fulfill during the interview process. In this process, it is observed how the student finds a solution to the problem situation.

The main problem area of this process is the incompatibility between the practice and the predefined directions. According to the Ministry of Education Directive (MoNET, 2024), students should be determined according to each

grade level, but in practice, there is a tendency to offer 20% of students from each grade. Or, if the students who were offered in the first year do not win, there may be situations where they are not offered in the second year. For this reason, problems occur in classes where the number of bright students is high. Schools are seriously criticized by parents on this issue.

As an alternative method, it may be appropriate to use more concrete data such as students' grade point averages in certain courses when determining 20% of the students in this process. In this sense, it would be more accurate to reconsider the definition of gifted and use the term bright or successful instead of this definition.

Problems with diagnosis students at once

Student diagnosis is done once for SAC students. No further diagnosis is made until they graduate. This situation leads to raise two issues. First of all, we do not have sufficient information on whether SACs are effective or not because up-to-date data about student development is not gathered. On the other hand, The Ministry of Education consumes a serious budget for each student. Considering that this budget includes constantly spent consumable tools and laboratory materials, a much larger budget is consumed on these students compared to normal schools. For this reason, these institutions should be more useful and they are serious investments that cannot be considered as ordinary activity centers. A more realistic approach is to observe the results of such a large investment more concretely.

A second problem is that a single diagnosis causes one to ignore the development of the individual. Studies reveal that, as the age of the individual changes, IQ scores vary incredibly depending on many factors. (Clarke & Clarke, 1976; Hedman, 2013; Shenk, 2017; Svendsen 1983). This change can be positive or negative. In this sense, failure to observe student development at later ages is a serious problem for these institutions. Laili et al. (2020) state that the results of intelligence tests conducted at the 3rd grade or below level are quite incompatible with the results of the tests conducted at the college level. Therefore both the exclusion of students with potential and the questioning of the competence of students within the institution are an increasingly deepening problem area. SAC teachers, on the other hand, think that the incoming student profile is getting worse every year. Regarding this issue, it is thought that the rate of less bright students is increasing in these institutions due to certain reasons (such as the selection process, the number of students selected, the awareness of the test applied, etc.). Although there is not enough data on this subject, a significant portion of the students currently come from schools that accept students at the high school level without examination. In addition, behavioral problems are increasing and it is thought that the rate of students with low interest in science is increasing. On the other hand, a certain portion of the students who continue their education state that they came just to carry this badge or under pressure from their parents.

The basis of this problem lies primarily in the use of the “gifted student" term. In order to eliminate the problem, students must be re-diagnosed at further grade levels and detailed student portfolios should be prepared. Observing student development may allow students to check themselves, enable them to measure the effectiveness of these institutions more concretely, give a chance to students who could not take this exam in the first years, and enable more students to receive education from these institutions. However, to make such a continuous diagnosis, it is necessary to take into account the success and IQ level together and exams must include both intelligence and achievement tests.

Capacity problems in SACs

More than 30.000 students enroll in SACs every year. Nowadays, many SACs give education to over 1000 students. When these institutions were established, they were planned much lower than normal school capacities and groups consisted of 2-3 students. Today, there are serious problems in the number of workshops and classrooms. Today, SACs transformed into centers that try to organize activities with groups of up to 15 students, where teachers try to control the students rather than trying to provide an effective learning environment and face serious discipline problems. According to the 2024 Ministry of Education Directive; the upper limits in groups are determined for RET up to 15, ITRP up to 11, STDP up to 8, and proje groups up to 6 students. Since the capacity of the institution is not sufficient, the number of students in the groups is close to these values. In this sense, doing a project with 6 students at

the same time or doing manual dexterity work with 15 students causes both material problems, control problems, and content-related problems. Student recruitment is based on the number of students who demonstrate certain qualifications, not the capacity of the institutions. In this sense, since the number of students taking the exam increases rapidly every year, the number of students in institutions has approximately doubled in the last 4 years. The main reason for this situation is the application of norm-based intelligence tests in student diagnosis. Therefore, with such a definition, the capacity problem of SACs is getting deeper. To reduce this problem, the number of these institutions has been rapidly increased. However, this has caused the quality problem to increase in SACs and is not a sustainable solution.

As a solution proposal, if these institutions recognize and select successful students, not gifted students, and in this sense, if recruitment is made by taking into account the capacity of the institutions rather than norm-based, both the capacity problem and the problem of unqualified students can be reduced. Unpredictable student numbers force these institutions to transform into ordinary schools. As a result, teacher quality, student quality, and education quality are gradually decreasing.

Problems with teacher quality

Teachers in these institutions are undoubtedly expected to be competent in special student pedagogy, hands-on applications and project development. In this sense, it is inevitable for teachers to have a certain level of qualifications. Nevertheless, there is only one criterion for candidate teachers which is to have completed their compulsory teaching period. Three times the number of empty positions are nominated for interview and the selection is made under the supervision of MoNET department heads. However, there are serious problems in practice, especially in rural areas. Teachers have prejudices against these institutions regarding additional course fees and late-hour working times. For this reason, very few teachers prefer to work in SACs. Especially in high school subject domains, many teachers are nominated by choosing among 1 or 2 teachers. The main problem here is that teachers are nominated without considering the prerequisites such as, pedagogical knowledge, classroom control ability, and communication ability with children for classroom teachers, or pedagogical content knowledge, laboratory practice ability, and project management ability for science teachers. Additionally, postgraduate education, ceritificates and language level should be added as part of the selection criteria. Admitted teachers to these institutions without meeting any of these criteria cause serious quality problems.

Although selection criteria for teacher quality is the easiest method, it is not sustainable since these institutions are not preferred by teachers anyway. Since these institutions do not have support and training course and teachers cannot complete thirty course hours, the additional course fee is quite less compared to other schools. In this sense, evaluating TÜBITAK and Teknofest and Erasmus projects within the scope of extracurricular activities or DYK rather than in-course activities, will increase the teacher income and raise the attractiveness of these institutions.

It can be suggested that SAC teachers need to gather a certain number of points in their field for three years. According to their performance, teachers may be recommended or not preferred to work in SACs again. This score can be measured by variables such as the number of projects completed, the number of studies and activities, degrees received, teacher educational background, and student-parent satisfaction.

There are a significant number of teachers with doctoral degrees in SACs, and this number is rapidly increasing day by day. Since project studies are given importance in SACs, there is a need for teachers who use academic backgrounds. However, it is known that teachers who complete their doctorates have a low desire to stay in these institutions. The main reason for this is that teachers are prevented from doing academic studies with students in these institutions by procedures and the infrastructure in which teachers can do academic work has not been established. To eliminate this situation, university libraries, programs, and databases must first be open to SAC teachers. This situation can be solved with common protocols.

Problems with subject domain incompatibility

One of the main problem areas in SACs is the inability to provide in-depth education. These institutions aim to provide students with deeper learning in addition to their regular schools. But courses are not designed in this way. For example, secondary school students receive education from a science teacher, and high school students receive education from a physics teacher. These teachers are theoretically trying to implement the same educational content as in the regular school. This situation works more like a process of completing the missing laboratory or application studies done at school, rather than deep learning.

In this sense, subject domains need to be reorganized. It can have a serious impact if students at every level are educated by an instructor of a higher level. Although this situation may seem problematic in terms of educational psychology, it is a fact that instructors specialized in a certain field are needed to provide a deep learning environment. Students' scientific interests, especially at high school levels, cannot be adequately met. Thus developed countries in the field of special education are implementing similar practices. In this sense, institutions in America, Russia, and Europe, university faculty members provide the educational practices even at primary level grades in partnership with universities, provide continuous teacher training and content updating that emphasizes in-depth learning (Grigorenko, 2017; Reid & Horváthová, 2016; Reid, 2015).

In this sense, branch updating should be done not with classroom teachers in resource education room classes, but with instructors who are more specialized in their fields, such as science, primary school mathematics, and informatics teachers, physics, chemistry, biology, and history geography teachers in middle school subjects, electronics, computers, software, mechanics and solid-state physicists in high school subjects. In this sense, it is more appropriate for these institutions to have both in connection with the Ministry of Education and universities.

Another problem in SACs is the insufficient curriculum of the project management students. The basis of this situation lies in the fact that SACs have insufficient educational content for high school students. With the regulation in 2020, students are in grades 9-12. accepted as Project development level students. In this respect, it is very important to update the subject domains in depth. Project students are expected to do a project in at least one subject. The project implementation is theoretically suitable, but it has serious problems in practice. In particular, it is unclear what students courses that they donot have to do project. This situation not only triggers student absenteeism but also causes SACs to not benefit sufficiently by these students during the period when the student can be most productive in terms of intelligence and knowledge.

As a suggestion; students can do activities and projects at 9-10 grades and only make projects in the 11th grade. Additionally 12th grades should be accpeted as graduated if they complete prequisite courses. Such a regulation can both reduce the problem of student absenteeism and enable BILSEMs to be more productive by deeply enriching the content.

Insufficient educational outcome problem

As instructional content, each SAC has its specific hands-on activities, unlike formal schools. These vary depending on the material, physical infrastructure and the teachers qualifications. The activities can be defined as in physics; pressure-force experiments, electronic applications, construction of simple engine mechanisms, the establishment of original experimental equipment, construction of simple generators, measurements... in chemistry; battery making, candle making, obtaining elemental compounds, making detonators, electrolysis, combustion-pressure experiments... in biology; determination of living characteristics, content analysis, use of microscope, plant and animal observations, mathematics; theorems and proofs, geometric applications, analytical applications, author-work applications in literature, story novel poetry writing applications, reading studies, book analysis... in history; examining old documents, examining historical events, ruins and finds, historical legends, analysis of events, reading documents... Games, applications, use of web tools, e-Twinning, Erasmus project applications related to reading, writing, listening,

and speaking skills in English... pictures, and studies such as applications directly related to the field of music are included. In addition, longer-term and comprehensive applications such as projects, patents, utility models, design registrations, and olympic studies are carried out. Students generally enjoy to attend the activities and there are not many attendance problems for the students involved in the intermediate grade levels.

However, none of these projects and activities are recorded in students' portfolios and students do not officially benefit directly from these studies. However, they spend serious effort and time for about 10 years. When we look at the practices in the world, this situation is seen as a general problem (Anuruthwong, 2017; Grigorenko, 2017). Although there are serious studies on student diagnosis, the process and the outcomes of gifted education are extremely unclear and inadequate. In this sense, regulating educational outcomes is an important step. There is no field yet where the graduation diplomas issued by these institutions are used. For this reason, especially at the high school level, students' willingness to participate is quite low and their absenteeism is high.

As a suggestion, education should be Baccalaureate style and include a foreign language at a level that will allow internationally recognized students to settle in an institution abroad. In this sense, a program should be prepared that will provide the possibility of going abroad where at least three basic courses are taught in English. Teacher selection should also be made on the qualifications that can provide this training.

Absenteeism problem in 12th and 8th grades

These institutions are non-formal education institutions that support formal education. Student attendance is optional. There are no exams, grades, homework, a fixed curriculum, or even course duration. Courses can be applied in blocks or separate, for one hour, fifty or fourty minutes. Teachers act as mentors rather than instructor, and instead of a teacher-student relationship, there is a mentor-student relationship. Students do not have grade or exam anxiety. In addition, the attendance limit is set at 30%. Students who exceed the attendance limit may or may not be dismissed at the end of the year, depending on the initiative of the institution. Parents can also follow the absences through mebbis system with the latest updates. While student absenteeism did not pose much of a problem until recent years, the desire to dismiss has also increased with the increasing number of students. 10 years ago, SACs were institutions preferred by teachers who could not find the norm or who were waiting for retirement, had a number of students well below their capacity, and had attendance problems. Bakioğlu & Levent (2013) stated that SACs operated with a high absenteeism rate and worked at 47% capacity in 2010. Today, there are serious efforts to become the favorite institution of the Ministry of Education.

MoNET gives more importance to absenteeism due to the institutional capacities are already above the desired level and it is meaningless to prepare course schedules for absent students. Therefore, the attendance problem will be felt more seriously in the near future. However, students' dismissing process should be standardized, and should not be left institution's initiative. A second issue is that especially in the 8th and 12th grades, the desire to attend is very low. They feel obliged to continue SAC due to attendance problem so their willingness to participate in the activities is very low. While this situation is a serious motivation problem for teachers, it is also problematic for the efficiency of SACs. In this sense, serious regulations are needed. Especially students who are 12th grade should be excepted graduated. Otherwise, thousands of students are left to the initiative of the institutions regarding their expulsion. Increasing the attendance limit in 8th grade may be a temporary solution.

Essentially, in order to solve this problem, the graduation certificate received from these institutions must be a useful document. This only requires a change in its content and students graduating from here must have a portfolio that will allow them to be accepted into a university even abroad.

Problems with administrator quality

Graduated students from SACs are expected to be trained in a way that will shape the country's policies, and these institutions were established with this vision. This is exactly the purpose of countries investing in these students. Despite this, there is a serious vision problem in SACs. These institutions have turned into institutions that only need

to carry out a certain number of projects and patent studies. Rather than the content of the activities, it is focused on which the number of competitions and projects teachers participate in. The main reason is that the administrators of the institutions are not visionary and competent. The fact that administrators try to manage these institutions like the formal education institutions. This approach makes these institutions seriously inefficient. In this context, there are very good institutions in Europe and Asia that place a significant portion of their students in the best universities in the world. Almost all of these institutions are managed with a system that uses university resources directly, institutional administrators are appointed by the university, and the transactions in the institution are carried out by the institution manager working in these institutions.

In order for SACs to provide quality academic education, their administrators are expected to be qualified and prone to academic studies. As a matter of fact, currently, the majority of SAC principals consist of primary school teachers. In this sense, it would be a more appropriate practice for the administrators of these institutions to be direct academicians and people working in the field of special education. While one leg of these institutions should be in the MoNET and the other in the university, the department to which SACs are affiliated should also be organized in connection with Higher Education Council of Turkiye in this way. However, it is known that the management approach in Turkiye is not flexible enough for a hybrid application in this context.

Problems with unplanned expenditure

The quality of applications in SACs is related to the materials they have as well as the qualifications of the teachers. The unpredictably increasing number of students seriously strains these institutions in terms of material needs. It is inevitable for every student to consume a lot of course tools, especially as long as they do hands-on activities such as art and science. It is a fact that students have the perception that these institutions provide free education, which causes the materials to be used carelessly. In this sense, teachers are trying to overcome this situation by simplifying the activities they do, increasing theoretical practices, and turning to cheaper materials such as paper, pencils, and scissors. As a matter of fact, the applications have been simplified to that extent.

The materials sent by the MoNET are not capable of supporting current applications rather the materials provided to normal schools with the same content as 30 years ago. Institutions try to solve the problem of outdated and insufficient materials with the provided annual budget. At this point, the problem of spending the budget unbalanced in a short time arises. Units cannot purchase enough consumables, the impression is given that the budget must be spent in a short time, and if the relationship with the administration is not very good, serious material problems occur.

To reduce this problem, the budget should come to the institution on a unit-specific basis rather than in general. This problem can be reduced by informing the expenses and making payments against the invoice. It is known that in many SACs, even the institution is in serious need of materials, some of the incoming budget goes back unspent. However, it is often discussed that the budget that comes with it is too small for laboratory studies. This unplanned use of this very limited budget is a serious problem.

Problems with insufficient infrastructure

Today,SACs are not institutions that provide education to gifted or highly talented students. Activities are carried out on a group base, not individually. Although there are students with very different capacities, interests, and behavioral characteristics in each group, all students are exposed to the same procedures and contents. Laboratory studies, which cannot be done frequently in normal schools, are tried to be implemented in a more planned way. Nevertheless, each SACs implements different practices regarding their opportunities.

SACs carry out many studies to prepare students for scientific research competitions such as TÜBİTAK and Teknofest. Serious materials and equipment are needed. However, SACs do not have sufficient infrastructure in this regard. Although the majority of SACs buildings have been renovated, the existence of such a problem shows that this problem will continue for a long time. SACs laboratories are delivered even less equipped than normal schools. Physics, chemistry and biology classes have many unique equipment such as electrical parts, fume hood systems or

microscope connections, but these institutions are not delivered with such ready-made equipment. In addition, although there must be a small observatory or material room for astronomy studies, very few SACs have observatories. The main reason for this is that SACs are designed and built like normal schools. In order to solve this problem, very serious projects need to be created and budgets must be allocated.

Results and Suggestions

Problem areas and suggestions are summarized in Table 2. These problem areas can be examined under 5 headings. These are problems related to the diagnosis process, students, teacher qualifications and branches, education content, and the institution. It is clear that each question is related to other problem areas. Highlighting the problems in BILSEMs in certain areas and ignoring some problem areas will prevent the development of these institutions. While some problems may require more than one solution, some problems can be solved more isolated and in a shorter period.

The main solution to problems related to diagnosis is to reconsider the term “gifted student”. In this sense, the IQ test and the student's in-class success should be evaluated together during the diagnostic process. Additionally, the efficiency of institutions can be enhanced by performing a new diagnostic process.

In addition to the suggestions in the diagnosis process in solving student-related problems, student groups should be made smaller and recruitment should be made according to the capacity of the institution. In terms of the absenteeism problem, it may be suggested that a regulation regarding attendance be introduced in the 8th grade and that the 12th grade be given graduate status. In this sense, an international program needs to be implemented to break students' prejudices against these institutions and being a BILSEM student more attractive. Moreover, not every gifted student is at the same level and BILSEMs are not suitable for students at very high levels, so full-time institutions need to be expanded for these students.

Teacher quality is an important variable in BILSEMs. In this sense, in order to make these institutions more attractive, project management courses should be considered as additional courses that provide extra fee for teachers. In addition, laboratories should be developed and protocols that allow teachers to use university infrastructures more functionally should be implemented centrally.

There are serious problems with the content in these institutions also. First of all, the instruction content does not enough comprehensive and interesting for gifted students. More specifically, the content is insufficient, especially in high school groups.Therefore, in addition to better equipped laboratories, the content must be regulated by both course domain regulations, teacher selection, and a valid diploma. In addition to these measures, realistic and comprehensive student portfolios should be prepared in a more useful way.

Besides, there are also institutional problems. The main problems are insufficient and unplanned budget expenditures. To alleviate this problem, a budget needs to be planned for each course unit. Additionally, the capacity of the institution should be predictable, so students should be admitted according to the capacity of the institution. The managerial application can be carried out through an institution manager appointed by the university and a coordinator manager appointed by the MoNET. This application is also widely used in the world. If the processes of leaving the institution and severing ties are carried out centrally rather than from the institution, arbitrary practices will decrease and the corporate culture can improve.

Table 2. Issues and suggestions in SACs

Related fields	Issues	Suggestions
	Issues in the student proposal process	[2]
Diagnostic	Diagnosis only in the first 3 years	[2], [3]
	Increasing prevalence of diagnostic tool	[1], [2], [17]
Student	Increasing number of unsuccessful students	[1], [2], [3], [14]
	No individual training	[2], [4]
	Groups are crowded	[4], [14]
	Absenteeism	[3], [5], [16]
	Unwillingness problem in 8th and 12th grades	[3], [5], [6], [16]
	Failure to diagnose at later ages	[1], [2], [17]
	Lack of institutions suitable for students with very high talent	[18]
Teacher		
	Unqualified teacher issue	[6], [7], [8], [10]
	Courses are incompatible for gifted student	[6], [8]
	Insufficient additional lesson fee issue	[10]
	Lack of opportunities for academic studies	[9], [11]
Content		
	Education quality is not appropriate for gifted students	[6], [8], [9], [11]
	Lack of use for SAC graduation diplomas	[6]
	Not creating student portfolios	[12]
	Insufficient content in high school groups	[4], [6], [8], [9], [11]
Institution		
	Insufficient budget	[9], [13], [14]
	Unplanned use of the budget	[13]
	The equipment list is not update	[11], [13]
	Lack of laboratory infrastructure	[11]
	Lack of physical capacity of SACs	[11], [14]
	Insufficient managerial vision	[15]
	The dismissal process is at the initiative of the institution	[16]

Evaluation

As a result of the study, a model for the SACs diagnosis and training process was described (Figure 1). Although the problem areas are clear, suggestions and training models can be created in different ways. In this study, certain problem areas and solution suggestions are expressed. The identified main problem areas (Table 2) and recommendations (Table 3) have been tried to be briefly summarized. While some of these problems can be easily resolved, some require serious changes or even a vision change. Since it is not clear in our country exactly why SACs were established, they are currently oscillating between being closed or developed. It is important to transform these institutions, which each administration shapes within the framework of its perspective, by presenting a broader vision. Still, our country is one of the few countries in the world that makes such large investments for gifted individuals. Although the results of the investments cannot be directly observed, they provide serious gains to students and teachers. These institutions, where students and teachers are examined from different perspectives, are important to identify deficiencies in formal education. It is important for those who produce and manage policies to examine these institutions, which host thousands of project studies and millions of application studies every year, from a more comprehensive perspective. Within the scope of this study, an attempt was made to compile the shortcomings and important aspects of these

institutions from an insider's perspective. All these problem areas are common problems in both central and provincial SACs. To solve these problems, accurate information, a common mind, and more importantly, managers with vision and conscience are needed.

Table 3. Suggestions for issues

No	Suggestions	Related field
1	IQ test and course success level should be used together in student selection.	Diagnosing, student
2	Using "successful" term instead of "gifted"	Diagnosing, student
3	Diagnosis should be made at the beginning of each stage rather than once	Diagnosing, student
4	Should be worked with smaller groups	Student
5	Flexible attendance in 8th graders should be applied, additionally 12th graders should accept as graduates if they fulfill the requirements	Student
6	Implement an international program that has validity across countries	Student, teacher, content,
7	Increasing teacher selection criteria for BİLSEMs.	Teacher
8	The courses should be regulated for more subfields to provide in-deep learning environment	Teacher, content
9	Making comprehensive protocols for using the university opportunities (library, central laboratories, programs)	Content, institution
10	Evaluating competition activities as additional fee to work at BİLSEMs more advantageous	Teacher
11	Improving laboratory equipment	Content, institution
12	Completion of digital infrastructure for portfolios	Content
13	A course-based budget should be introduced to ensure a more planned expenditure	Institution
14	The number of students to be admitted should be determined according to the current capacity of the institution	Content, institution
15	The institution manager must be appointed by the university, and the co-director must be appointed by the Ministry of Education	Institution
16	The dismissal process of students should be done by the Ministry of Education rather than BİLSEM management	Institution, student
17	Data in the diagnostic process needs to be clearer to researchers and the public	Institution, diagnosing, content
18	Full-time educational institutions should be established for highly gifted students	Institution, diagnosing, student

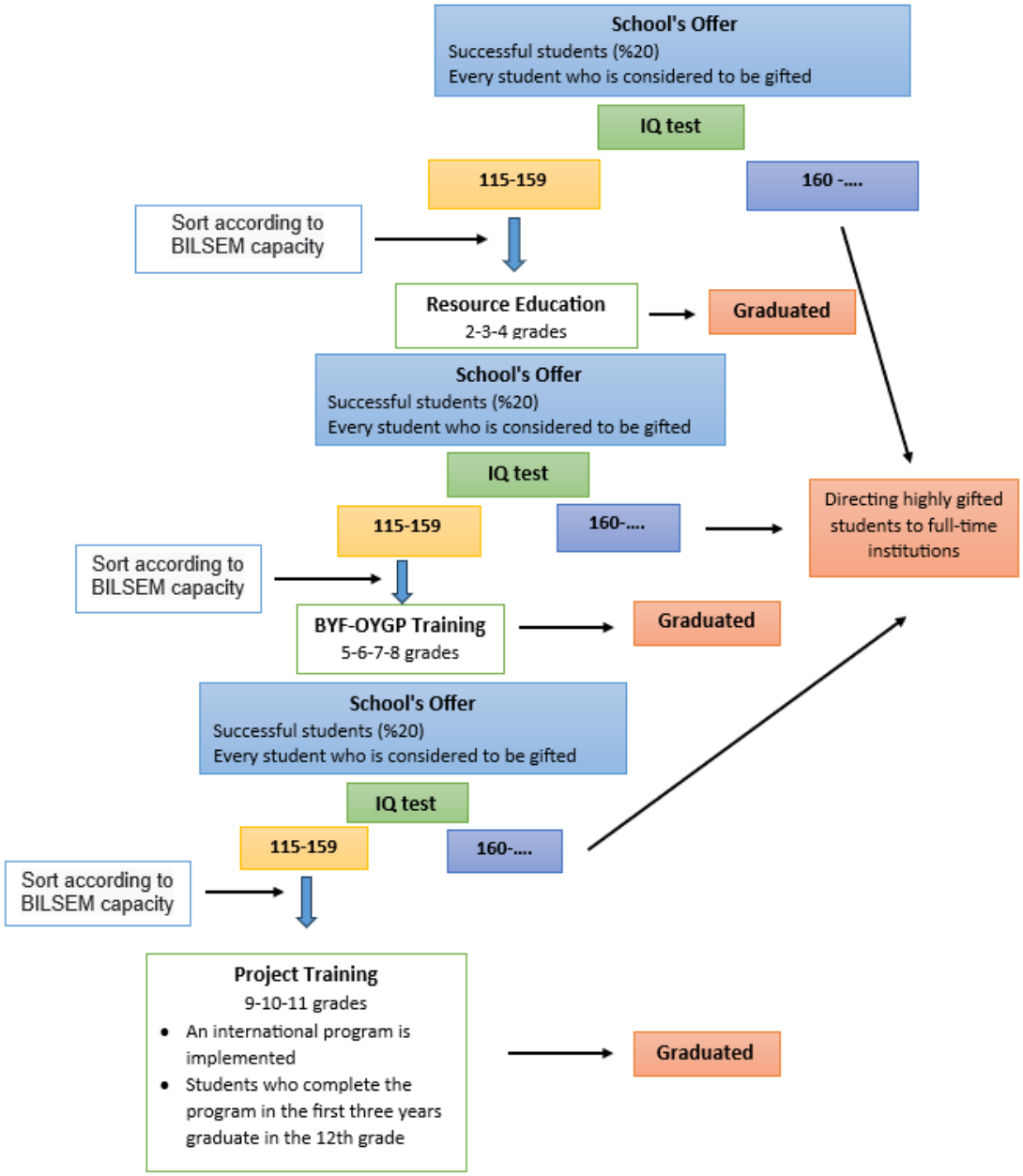

Figure 1. Diagnosis and training process model

Limitations of Study

The limited statistical data is available on gifted students by the MoNET. Therefore researcher has attempted to ensure study validity just by using literature. Secondly, this study does not provide comprehensive evidence due to the nature of the design. Dominantly researcher's perspective is taken into consideration for the evaluation process so that needs to be coutious for generalization.

Acknowledgment

This project received no financial support for the research. There is no conflict of interest for the research. I assure you that this study has not been published anywhere or is not in the process of being published.

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