School, class, and teacher features in science teaching *

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Abstract

The purpose of the current study is to determine the effects of physical and environmental conditions of schools, and the features of the class and teacher in the application process of Science and Technology curriculum of schools from different socioeconomic status (SES). The participants of the study composed of 2 schools with high SES, 2 with middle SES, and 2 with low SES, which were chosen via stratified sampling from Sakarya province central district elementary education schools that have low to middle, and high SES, and the directors and Science and Technology course instructors of that chosen schools. Qualitative data was acquired via the observations that were done in schools and classes, and from the interviews that were done with school directors and teachers. Acquired data was analyzed and following items were found: (1) In schools with high SES, having convenient opportunities provides advantages for the application of the science and technology curriculum. However, sometimes, courses are taught teacher centered because of crowded classes and time problems. (2) In schools with middle SES, science course is taught teacher centered because of the lack of laboratory, material insufficiency, and seating order in classes. (3) In schools with low SES, science course is taught teacher centered because of infrastructure insufficiency, high-class size, being not able to use laboratory, and material insufficiency.

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1. INTRODUCTION

In order to apply science and technology curriculum that aims to raise students with science and technology literacy as it is foreseen, it is necessary to transfer the curriculum to the classroom environment. The adequacy of environmental conditions that affect teaching- learning process gains importance in the curriculum in which the activities and experiments are dominant. If we think that the environmental factors that are considered as input

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affect the application process of the curriculum and the reaching level of students to the gains, the actualization level of the curriculum will be different in schools with different SES.

Moreover, it is important how teachers, responsible to apply the curriculum, evaluate the conditions of schools that they work.

“The application of the curriculum is successful if all conditions are improved especially the teacher factor. The development of curriculum depends on the development of expert, teacher, students, parent, course books, materials, and environmental factors” (Varış, 1988: 27). In order to apply curriculum realistically, it is necessary to consider the time and environment that is assigned to education, and the features of the education environment when the teaching-learning process is organized (Fidan, 1997). In an effective education environment, the learning level of the students and the reaching level of the school to its aims can change in relation to the resources the school have, the quality of the relationships in the school, the management understanding, and the in-class activity characteristics of the teacher (Celep, 2008). In addition, physical variables in the classroom that is in teacher’s charge should be arranged in a way that is motivating, informative, and interesting for students (Aydın, 2010). Similarly, learning environment should be arranged in a way that it should be provided multi-directional interaction between students-teacher, and student-student (Sonmez, 2007: 168).

The classroom size, one of the physical variables in the class, is an important factor that has an influence on the teaching style of the instructor. In crowded classrooms, teachers prefer traditional way of teaching, while in classrooms with small class size, they prefer teaching style, which depends on the active participation of the students (Aydın, 2010; Başar, 2001). Classrooms with small class size make active learning easier. The attention of students increases so does the opportunity to attend classroom activities (Başar, 2001).

Besides, the seating order in the classroom is important because it affects the student-student, and students-teacher interaction, and the education either positively or negatively. For seating order, there are two approaches as teacher centered, and student centered. In teacher-centered approach, students sit down one after another, and the course materials are arranged according to teacher. In such a classroom environment, the way of interaction is between teacher and students. On the other hand, in student centered seating order, either individually or as a group, seating order is preferred depending on the topic, and in both styles students can see each other easily. In those classroom settings, the student-teacher interaction is supplied as well as student-student interaction. Furthermore, seating order, either individually or as a group, which is arranged according to the aims of the topic, increases student success (Aydın, 2010). Students should feel independent, and arrange their experiences according to their abilities in classroom environment, more precisely in learning environment. Therefore, the classroom environment should be organized in accordance with student expectation (Celep, 2008). In addition, seating order that affects the interaction between students negatively, or makes student participation difficult should be avoided (Akbaşlı, 2011). “Having fixed desks, and sitting down either in doubles or in threes prevent students from performing group activities. Thus, learning approach that depends on cooperation cannot be applied because of the physical conditions of schools” (Brooks and Brooks, 1993: 7).

According to Dönmez (2008), in most of the schools, classrooms are very crowded, desks are not suitable for developmental features of students, and students sit down in threes on those double desks, teachers do not have any other option except for traditional seating order for teaching, desks continue till teacher table, classrooms are not enough in calefaction, airing, and lightening. Therefore, all these negative features prevent qualified teaching. Moreover, physical obstacles like desks, tables, cabinets, distance, and student create psychological problems between students and the teacher, so that change the communication and the interaction (Barker, 1982, Aktaran: Başar, 2001: 25).

In science and technology curriculum, the teaching-learning process, learning environment, teaching strategies, and learning experiences are determined in accordance with the principles of the constructivist approach. In constructivist approach, the main purpose is to provide meaningful and permanent learning. In order to achieve this, education activities should be configured in a way that enables students’ participation to learning experience, and it should be arranged in a way that improves students’ higher order thinking abilities (Çakıcı, 2008). Similarly, Tyler (1950) indicated that learning is achieved with the active participation of the student, and student learns what s/he does instead of what teacher does (Aktaran: Bloom, 1979: 20). In classrooms in which
the constructivist approach is applied, students are aware of the fact that they are responsible to configure information instead of being passive information receiver, and they are active participants of the learning process (Savery and Duffy, 1995). Furthermore, in science and technology course, in order to provide students’ active participation, and to succeed learning style of experiencing- doing with activities and experiments, it should be provided group works in laboratories while arranging learning environment (MEB, 2006).

In order to achieve the main purpose of science and technology curriculum, science and technology literacy, it is necessary to reflect the foreseen factors to learning environments. Therefore, it is important to determine physical conditions that are considered as input, and to identify their impacts on the application process of the curriculum in terms of compensating shortcomings before the application. Hence, in the present study, the physical conditions of schools and classrooms, technological equipments, and classroom environments are investigated as an input. Having enough equipments in science and technology classrooms, for science and technology education is fundamental to actualize the curriculum that depends on practice. Therefore, it is inevitable to experience application differences in teaching- learning process of the same curriculum, if we think that different schools with different levels of SES show differences in terms of physical conditions. It is important to determine the effects of those differences on the application process of the curriculum in order to provide schools with necessary infrastructure support.

2. METHOD

In the current study, the case study method was used as a qualitative research method. Six schools were chosen via stratified sampling from Sakarya province central district elementary schools. Two of the schools have high SES, two of them have middle SES, and two of them have low SES. Physical conditions of the schools that make up the sample were observed, and detailed information was taken by interviewing school directors. The science and technology course that was taught in either classes or laboratories was observed (average 50 class hours). The observations were noted by the experimenter in order to investigate the positive and negative effects of schools, class, and teacher in teaching science and technology course. Besides, the opinions of science and technology teachers were taken about the appropriateness of teaching- learning environment, and positive and negative aspects of the application of science and technology curriculum. Schools with high SES were coded as H1, and H2, schools with middle SES were coded as M1, and M2, and schools with low SES were coded as L1, and L2. Moreover, teachers that were interviewed were coded as T1, T2, ….T6. Data, which was acquired via observations and interviews was analyzed, and interpreted.

3. FINDINGS

The findings that were derived from school, and class observations and interviews with school directors and teachers in order to determine physical and environmental conditions of schools from different SES, and to determine the features of classes and teachers were presented below.

3.1. Features about H1 School, H1 class and T2 teacher:

H1 School, which is in the center of Sakarya province, began to education service in 1972 as a primary school. In 1998, the Ministry of Education did a change in National Education Fundamental Law, and the school began to give service as an elementary school. School building has 2460 m² closed area. The school is triplex and each storey is 820 m². Moreover, it has 24 classrooms, a conference hall up to 300 people, a science and technology laboratory, an information technology classroom with 38 computers, and 3 printers, a technical work workshop, a photocoppy room, a canteen, department of preschool education, a room for the manager, a room for the assistant manager, and a room for teachers. As a school employee, there are a manager, 3 assistant managers, a counselor, 8 kindergarten teachers, 30 class masters, 26 in- field- teachers, and 2 servants. Besides, there are 249 students in kindergarten, 220 students in the first grade, 287 students in the second grade, 333 students in the third grade, 288
students in the fourth grade, 300 in the fifth grade, 267 in the sixth grade, 331 in the seventh grade, 316 in the eighth grade, and total of 2591 students. There are six sections for each class level. In the school, morning and afternoon education system is used. H1 school is more crowded than other schools because it is preferred mostly by parents. Furthermore, with the help of its opportunities, the school can be characterized as well equipped. In terms of success in placement test, known as SBS in Turkey, in 2008, 210 students from H1 schools took the point more than 400 that brought a good reputation to the school. In addition, the sport is very important in H1 school so that students have championship in the province in different kinds of sports branches.

T2 teacher who is one of the four science and technology instructors at H1 school, was graduated from science and technology teacher ship of faculty of education, and has been performing teaching for 10 years in general, and for 6 years in H1 school.

The class in which the observation took place is in the second storey in H1 school. It is a crowded class with 52 students, 28 of them are female, and 24 of them are male. The movement area of students is restricted because the classroom has a 45 m² closed area. Moreover, there are three students in each desk. The teacher table, the blackboard, and front desks are interbedded, and very close to each other. The Figure 4-1 shows the classroom arrangement.

![Diagram](image.png)  
Figure 4-1. The observed classroom in H1 school

As it is seen in Figure 4-1, in classroom arrangement in H1 school, students sit down one after another and with this arrangement the interaction between students cannot be provided. However, it was observed that T2 teacher wants students to put desk together in break times for group works. By combining two desks, six -people groups are created. Students in groups sit down opposing in combining desks. With the help of this arrangement, the interaction between students is supplied. The T2 teacher explains the work that each student performs so that the activity is done collectively. The products that students create, are represented in class pin boards. Besides, it was observed that T2 teacher takes the photos of products of students that are represented in class pin boards and hangs them on to the pin boards at each storey. In the class activities, the accessible materials are used so that the teacher wants students to bring those materials. For the activities that are done with laboratory materials, students go to the science and technology laboratory. The activities in laboratory are performed by the teacher due to crowdedness of the class and students follow those activities while standing. Furthermore, for unperformed activities, students watch them on the internet with the help of Vitamin program in information technology classroom. It was observed that T2 teacher has some problems while trying to perform activities and to manage students due to crowedness of the class. Nevertheless, T2 teacher considers coping with those difficulties as a duty of the teacher and tries to minimize them. T2 teacher indicated his/ her opinion during the interview as follows: “Of course I experience some troubles but we are teachers and our duty is to minimize those troubles, everything depends on us. If there is a disadvantage, we should turn it to an advantage. I think we should not give up without applying it just because it has a disadvantage.”

3.2. Features about H2 school, H2 class, and T5 teacher:
H2 school, located in the centre of Sakarya, was started to give education service in 2000-2001 academic year, it was established on the 1700 m² land, and it has 6040 m² closed area as a building. School building is triplex and each storey is 1800 m². There are 32 classrooms, a conference room up to 220 people, a science and technology laboratory, an information technology classroom with 24 computers and a printer, a visual arts workshop, two technology design workshops, a classroom for music, separate canteens for 1 to 5th grades and 6 to 8th grades, a library including approximately 6500 books, a cafeteria up to 300 people, a room for parent meetings, a room for the director, a room for the assistant director, and a room for teachers. All classrooms have projector, and continuous internet connectivity. Besides, there are a manager, 3 manager assistants, a counselor, 3 kindergarten teachers, 20 class masters, 20 in- field- teachers, a library employee, a secretary, and 5 servants in H2 school. In addition, H2 school covers 80 students in kindergarten, 172 students in the first grade, 176 students in the second grade, 175 in the 3rd grade, 173 in the 4th grade, 176 in the 5th grade, 180 in the 6th grade, 182 in the 7th grade, and 185 in the 8th grade, and total of 1499 students. Each grade has four sections. H2 school gives service full day (between 09:00 and 15:00), and it is well- equipped. Moreover, H2 school organizes social activities for both students and parents regularly. Furthermore, H2 school gives importance to the sports activities, and students have many championships in the province and in the region in different branches of sports. In addition to the sports, H2 school encourages students to attend chess tournaments, and students have championship in this area also. In terms of success in placement exam, SBS, as compared to other schools, there are more students in H2 school who earn a right to go to the science high schools.

T5 teacher who is one of the two science and technology teachers in H2 school, was graduated from science and technology teacher ship of the faculty of education and has been doing teacher ship for 14 years. Moreover, T5 has been doing teacher ship in H2 school for 4 years. T5 teacher thinks the conditions of the H2 school are very available for his/ her course. During the interview, s/he reported his/ her idea about preparing the appropriate learning environment like this: “I have an advantage because there is a laboratory in the school, in addition to projector and computer. I can provide students with visuality by using them...”

T5 teacher teaches his/ her lessons mostly at science and technology classroom that is described as science and technology laboratory. The classroom in which the observations took place is in the second floor of H2 school. It is a crowded class with 45 students. 19 of the students are female, and 26 of them are male. The movement area of students is not so restricted because the classroom has 52 m² closed area. Furthermore, students sit down side by side in a U shape. Figure 4-2 represents the arrangement of the classroom.

![Figure 4-2. Science and technology classroom in H2 school in which the observations took place.](image_url)

As it can be seen in Figure 4-2, students sit down in a U shape so that the interaction between them can be supplied easily. In the cabinets that are placed in the classroom, there are activity and experiment materials. T5 teacher makes 5- 6 student- groups for activities, and half of the students sit down inside of the U shape table, and other half sit down outside of the U shape table, which makes students sit down face to face. Thus, this increases the interaction between group members. T5 teacher wants students to bring some materials that do not exist in the laboratory for some activities. Moreover, it was observed that T5 teacher makes students do activities that do not take too much time as a group, and s/he does other activities that take too much time by himself/ herself. T5 teacher indicated this situation during the interviews as follows: “I want students to bring materials for some activities, and we do them in classroom. However, this can be few in number. We can do short term activities in
class because we experience a chaos due to the crowdedness of the class. I give some activities as assignment.
For some activities, I do them and students follow me.” T5 teacher uses the computer and the projector in classroom frequently, and also s/he makes students watch the topics on the internet with the help of Vitamin program. Besides, T5 teacher takes students to their usual classroom in order to solve some questions about the topics. In this class, the desks are arranged one after another.

3.3. Features about M1 school, M1 classroom, and T3 teacher:

In 1969, M1 school began to give education service with 5 classrooms. In 2005, it was re-built, and in 2006-2007 academic year it started to give service again with three storeys and 16 classrooms. M1 school is in county town in Sakarya, it was built on 4406 m² land, and it has 2148 m²-closed area as a building. M1 school is triplex and each storey has 716 m²-closed area, and the school garden has 3690 m² area. In addition to 16 classrooms, there are a science and technology laboratory, an information technology classroom with 26 computers and a printer, a projection room, a canteen, a guidance service room, an archive room, a bookshelf, the manager room, the manager assistant room, and a room for teachers. Moreover, for disabled students, there is an elevator, and a toilet. Besides, the M1 school gives education service with a manager, 2 manager assistants, 2 kindergarten teachers, 10 class masters, 5 in- field- teachers, and a servant. There are 31 students in kindergarten, 118 in the first grade, 84 in the second grade, 76 in the third grade, 83 in the fourth grade, 76 in the fifth grade, 64 in the sixth grade, 48 in the seventh grade, and 63 in the eighth grade, total of 643 students. There are two sections for each grade in M1 school. The fixed classroom setting is used in the school that is each course has separate classroom. Moreover, 13 classrooms out of 16, have projector and internet connection. M1 school gives education service full day (from 09:00 to 15:00). The school organizes folk dancing activities, and chess training. In chess, school earned a degree in top three.

T3 teacher is the only science and technology teacher in M1 school. S/he was graduated from science and technology teacher ship of the faculty of education. S/he has been doing teacher ship for 5 years in M1 school, and for 6 years in general.

The classroom in which observation took placed in M1 school, is called as science and technology classroom. The classroom is in the second storey of the school, and it has approximately 38 m²-closed area. There are 32 students in the class, 17 of them are female, and 15 of them are male. The movement area of students in the class is not restricted. Students sit down side by side in a U shape. Figure 4-3 shows the arrangement of the classroom.

![Diagram of the M1 classroom](image_url)

Figure 4-3. The observed science and technology classroom in M1 school

As Figure 4-3 demonstrates, seating order in M1 class is as a U shape so that students can see each other easily. Although the classroom is a science and technology class, the materials in the cabinets are not enough in number and in diversity. T3 teacher wants students to bring materials, and s/he brings also. During the observation, T3 teacher did some activities by himself/ herself. S/he asked some questions to students, and encouraged them to raise their opinions while s/he was doing activities. Generally, s/he gave activities, not done in class, as assignments to students. Moreover, it was observed that T3 teacher made students watch unperformed activities on the internet with the help of Vitamin program. Furthermore, relying on observations, T3 teacher provided each student to take part in teaching- learning process because the class is not so crowded.
3.4. Features about M2 school, M2 classroom, and T6 teacher:

M2 school started to give education service in 1973, and it continued to give that service with its new block that was established in 1996 with 3000 m² closed area, and 24 classrooms. The school was established on 6600 m² land, and it has 3900 m² closed area. Moreover, there are 30 classrooms, 2 kindergarten classrooms, a science and technology laboratory, a technology design work shop, a visual arts work shop, an information technology classroom, a manager room, 2 manager assistant rooms, a counselor room, a room for teachers, a library, a sports hall, a parent meeting room, a canteen, an archive, and a servant room in M2 school. Moreover, it gives service with a manager, 2 manager assistants, a counselor, 2 kindergarten teachers, 15 class masters, 18 infield- teachers, and 3 servants. Furthermore, there are 32 students in kindergarten, 73 students in the first grade, 80 in the second grade, 82 in the third grade, 67 in the fourth grade, 72 in the fifth grade, 63 in the sixth grade, 66 in the seventh grade, 102 in the eighth grade, and total of 637 students. There are 2 sections in the kindergarten, and three sections for each grade. There are a projector and internet connection in every classroom. The school gives education service full day (from 09:00 to 15:00).

T6 teacher is the only science and technology teacher of the M2 school. T6 teacher was graduated from science and technology teacher ship of the faculty of education and T6 has been working for 7 years in M2 school, total of 8 years in teacher ship.

The classroom that observation took place is called science and technology class in the school. It has approximately 32 m²-closed area. There are 26 students, 14 of them are male, and 12 of them are female. The movement area of students is not restricted due to small class size. Students sit down in doubles on desks in the class. In seating arrangement, desks are one after another that makes interaction between students weaker. Figure 4-4 shows classroom arrangement.

![Figure 4-4. The observed science and technology classroom in M2 school](image)

M2 classroom, science and technology class, has a normal classroom arrangement on basement as seen in Figure 4-4. In the cabinet, there are some little glass tubes, and beakers as materials. During the interview T6 teacher reported this situation as follows: “I cannot do most of the activities because we do not have a laboratory and necessary materials. We try to do something with daily materials in our houses, but it is not applied as much as it is needed.” During the observation, T6 teacher did an activity with students in the class, and wanted students to bring materials for that. It was observed that T6 teacher made students watch unperformed activities on the internet with the help of Vitamin program by using the projector and the computer in the classroom. T6 teacher teaches lessons by asking questions to students frequently, and wanting them to report the situations that they confront in daily life. By doing this, T6 teacher encourages students to participate. Moreover, T6 knows every student’s names in the class due to small class size, and encourages everyone to share their opinions.

3.5. Features about L1 school, L1 classroom, and T1 teacher:
The L1 school that is in Sakarya central district was established in 1957. The courses started to be taught in prefabs due to the damage in school building in 1999 Adapazarı earthquake. Later, additional building was established next to the prefab. The additional building is duplex and has 1097 m² closed area. The prefab is single-layered and has 816 m²-closed area. The school has 1500 m² garden. The courses are taught in prefab and in additional building. The additional building has 10 classrooms, a science and technology laboratory, a technology design workshop, an information technology classroom with 17 computers and a printer, a library, a manager assistant room. The prefab has 15 classrooms, 2 kindergarten classrooms, a manager room, a manager assistant room, a counselor room, and a room for teachers. The school canteen is on the garden. There are a manager, 2 manager assistants, 2 kindergarten teachers, 17 class masters, 17 in-field teachers, and 2 servants in L1 school. Moreover, there are 40 students in the kindergarten, 93 in the first grade, 97 in the second grade, 90 in the third grade, 119 in the fourth grade, 107 in the fifth grade, 102 in the sixth grade, 74 in the seventh grade, 88 in the eighth grade, total of 814 students. The morning and afternoon education system is used in L1 school.

The T1 teacher is one of the two science and technology teachers in L1 school. T1 teacher was graduated from science and technology teacher ship of the faculty of education, and has been doing teacher ship for 12 years. T1 teacher has been working in L1 school for a year.

The observed classroom in L1 school is in prefab, and it has approximately 30 m²-closed area. The class size is 32, 17 male students and 15 female students. Students sit down in doubles in their desks.

![Figure 4-5. The observed classroom in L1 school](image)

As seen in Figure 4-5, student desks are arranged one after another. There is too much noise from the outside during the lessons because the classroom is prefab, the windows are large, and they see the school garden directly. T1 teacher indicated his/her opinion about this condition during the interview as a disadvantage of the application process of the curriculum. “...there is too much noise from outside because the school is prefab...” It was observed that during the observation T1 teacher did not do any activity. Teacher teaches lessons by making one volunteer student read the topic from the course book, and making other students follow it from their books. Sometimes, T1 asks questions to students and chooses only 1-2 students who raise hands. In some classes, T1 showed some posters about the topic to students. In the observation, T1 took students to the informatics classroom in a course hour, but the lesson could not be taught there because it was not available. T1 indicated this situation like this “…the conditions of the school is not good, there is no material in the laboratory. The informatics classroom is not available. One-hour visuals per week are not enough for students. School has lots of financial problems...” It was observed that T1 teacher experienced some problems related to class management. T1 tried to prevent these problems by giving minus point to students who were talking within themselves.

3.6. Features about L2 school, L2 classroom, and T4 teacher:

The L2 school that is in the central district of Sakarya province was established before the proclamation of the Republic of Turkey. In 1957, the school building was demolished with the earthquake, it was given a label as dangerous, and a modern building was established. In 1960, the school began to give education service. The additional building, next to the school, and having 6 classrooms, started to be constructed in 1985, and in September 1987 it was opened to education service. The school is triplex with a total closed area of 735 m². The
school garden is 1300 m². There are 13 classrooms, 2 kindergarten classrooms, a science and technology laboratory, a technology design workshop, an information technology classroom with 19 computers and a printer, a manager room, a manager assistant room, a guidance room, a teacher room, a library, and a canteen in the L2 school. Moreover, the school gives education service with a manager, 2 assistant managers, 2 kindergarten teachers, 15 class masters, 19 in- field- teachers, and 2 servants. Furthermore, there are 31 students in the kindergarten, 57 in the first grade, 53 in the second grade, 78 in the third grade, 68 in the fourth grade, 99 in the fifth grade, 98 in the sixth grade, 93 in the seventh grade, 121 in the eighth grade, total of 698 students. There are three sections for each grade. In L2 school, morning and afternoon education system is used. The school is in the 24th order in the province according to the placement test (SBS) points.

T4 teacher is one of the two science and technology teachers in the L2 school. T4 was graduated from chemistry department of the faculty of arts and science, and T4 has been working for 7 years in L2 school, and for 16 years in general.

The observed classroom in L2 school is approximately 35 m² and has 42- student class size. 24 of the students are male, and 18 of them are female. Students sit down in doubles or in threes on their desks. The movement area of students is restricted because the class is crowded. Figure 4-6 shows the class arrangement.

![Classroom Arrangement](image)

Figure 4-6. The observed classroom in L2 school.

As Figure 4-6 illustrated that student desks are arranged one after another. It was observed that the interaction between students is restricted because of the desk arrangement, and lack of group work. Moreover, T4 did not apply any activity during the lessons. T4 taught lessons mostly in a traditional way and sometimes made students attend the lesson by asking questions. T4 indicated his/her opinions about the conditions of the school, and the class size as follows: “... I cannot apply the curriculum because our classes are too crowded. Our laboratory is not available. The conditions of our school are not sufficient....”

4. RESULTS AND DISCUSSION

In the current study, the effect of inputs in relation to the features of the school, the classroom, and the teacher on the application of science and technology curriculum was investigated. It was found that schools with high SES had better school and classroom environments, and more advantages than schools with middle SES, and schools with low SES; similarly, schools with middle SES had better school and classroom environments, and more advantages than schools with low SES.

Studies show that in terms of the arrangement of physical environment that affects classroom environment either positively or negatively, the careless, inattentive, and incomplete arrangements of the followings affect the class environment negatively: designing the classroom plan, preparing the materials that will be used in teaching-learning process, arranging seating order of the students, arranging the visuals as pin boards on which student exhibit their activities (Çakmak, 2005). In addition, for student centered education, a functional classroom environment in which students’ active participation is supplied, is foreseen. However, in most schools with traditional classroom environment, teachers are asked for student centered teaching (Saritas, 2005). It can be indicated that science and technology teacher in H1 school provides students with group work by arranging student desks, uses science and technology laboratory functionally in the teaching-learning process, and
encourages students to do new activities by hanging their activities to pin boards even though the classroom in H1 school has traditional seating order, and high class size. In H2 classroom, whose class size is high, the seating order of students is in a U shape so that multi-directional communication and interaction between students can be supplied. When the communication in the classroom is multi-directional (between students and the teacher as well as within students), it will be useful in terms of supplying information flow, determining problems, and interest and abilities of students, bringing students in positive behavior (Helvacioğlu, 2011). In M1 classroom students sit down in a U shape. Moreover, due to small class size, the interaction, and communication are provided easily. This is in line with researches that in classrooms with small class size, students have more opportunities to attend activities (Başar, 2001). In M2 classroom, the class size is small but student sit down in a traditional way. It was observed that in M1 and M2 schools, lack of laboratory and inadequacy of materials prevents the application of activities in the curriculum. Nevertheless, in both schools, unperformed activities are watched to students with the help of the projector, computer, and the internet connection in the classrooms. Research supports the importance of physical environment in the class that supporting physical environment in class with technological materials makes students be motivated, increases learning, and provides new information with persistency (Başar, 2001). For example, in H2 school, science and technology teacher has an advantage in terms of technological equipment in the classroom. Teacher in H2 school makes students watch unperformed activities with the help of technological equipment in the class. On the other hand, in L1 and L2 classrooms, high-class size, traditional seating orders, lack of laboratory and materials, lack of technological equipment make the application of science and technology curriculum impossible as it is supposed to be. This is in line with the study of Erdoğan (2007), which found that teachers indicated that high-class size affects the application of teaching methods and techniques as well as new evaluation methods negatively, because of this problem, they could not arrange their classrooms appropriately to the group work, and they left the seating order in a traditional way.

Shedding light on the findings of the current study, in order to prepare an effective and fruitful teaching-learning environment, and to provide necessary educational materials, the inadequacies of schools and classrooms should be determined, and necessary resources to compensate those inadequacies should be created.

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