Opinions of Primary School Science and Technology Teachers about Developing Students' Affective Competence

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Abstract

The present study aimed to determine the primary school secondary level science and technology teachers' opinions about developing students' affective competence. It was designed as case study with qualitative research method. The participants of the study consisted of 19 science and technology teachers with at least five year experience, who works at 14 different state primary school secondary levels in Eskisehir in Turkey. The data of the study was collected through semi-structured interviews with the teachers in March-April 2010. The interview form contained 10 questions and the responses to these questions were analyzed with NVivo8.0 program through content analysis approach. The findings of the study indicated that the Science and Technology teachers agreed on the significance of gaining the affective intelligence to students, however, they had lack of information and skills on this issue. According to the participant teachers, school administrators and teachers have important responsibilities for this issue, so the teachers were in struggle for using various teaching method and techniques to gain this competence. Yet, they felt inadequate about measurement and evaluation.

Keywords: *Science and technology teaching; affective domain; teachers' opinions*

Introduction

The essential qualities that the individual trained at education institutions with constantly changing according to time interval and current conditions; when compared with the past, some qualities that the ear requires become more prominent (Reich, 2001; Marcum, 2006). Nowadays, the basic function expected from the education institutions is to train individuals who think critically and creatively also who question, search and generate new information by using information technology (Adey & Shayer, 1994; Edwards & Bowman, 1996; Katz & Chard, 2000).

The aforementioned competences which are aimed to gain students at the education institutions could be categorized as affective and kinetic. During teaching process, it is important for students to develop in terms of affective and kinetic competences as a whole (Hauenstein, 1998; Anderson & Krathwohl, 2001).

The students' affective development and their affective competences play significant roles at every teaching level as well as in the individuals' lives; besides they could influence learning cognitive and kinetic skills either positively or negatively (Annesley & Putt, 1992).

Many countries are seeking for the new approaches to train the individuals with the aforementioned qualities; therefore they attempt to make their education programs more qualified. This trend has reflected to Turkey during restructuring and developing the primary school education programs in 2005-2006. By means of new education programs, it is aimed to train the individuals who question, solve problems, know how to learn, behave creative and sensitive towards the events, attain information, generate new information using the old information, use modern technologies efficiently and communicate effectively (MEB, 2005; Özdemir, 2005). To achieve these goals, the new program envisages many functional changes from creating the real-life teaching-learning environments on the basis of philosophical understanding to the perspectives on learning (Köseoğlu, 2004; Gelen & Beyazıt, 2007).

Science and technology is one of the important content domains in the primary school education programs, which contributes to developing students' knowledge, skill and attitudes as predicted in the information society. Science is defined as thinking on the nature of information, understanding the information and the process of generating new information (Gürdal, Şahin & Macaroğlu, 1996). By activating the scientific thinking, science education helps students think critically, solve problems, become suspicious, develop decision skills, have responsibility and become sensitive towards environmental problems; draw conclusions from the research and investigation as a good observer and make interpretations, draw conclusions. Besides, students could live effectively and successfully in an ever changing world and they could trained with the intellectual and social awareness according to their own skills, needs and interests, through this lesson (Krajcik, Czerniak & Berger, 1999). Science and technology education gains students positive attitude and behaviors as well as the skills for interpreting and perceiving the technological advances. Additionally, Science gains students the scientific process skills which facilitate learning, applying research methods and having responsibility of their own learning (Çepni, Ayas, Johnson & Turgut, 1996).

The Science and Technology education program involves affective competencies related to the target subject matter as well as many cognitive competencies. Science and technology teaching should help students gain distinguish their feelings; have enthusiasm to know, understand and interpret on the basis of evidence; scientific attitude and behaviors; become open-minded, skeptic; independent in thoughts and observations, think rationally and considering about the results; in other words this course should help students gain scientific attitude and attitudes (Okan, 1993; Hodson, 1998; Bıkmaz, 2001). In addition, Science and technology course is necessary to train a good citizen and person. For the current issues such air pollution, traffic accidents and saving the natural resources, this course plays an important role (Fensham,1985; Solomon & Aikenhead, 1994; Pedretti, 2005). Through Science and Technology education program, it is aimed to train students as science and technology literate. To achieve this, students should understand the nature of science and scientific information, basic science concepts, principles and laws, besides they should use the scientific process skills while solving and deciding so they should comprehend the interaction among science, technology, society and environment and they should have the scientific attitude and values (Forbes 2000; Richardson & Blades, 2001).

To accomplish the aims of the Science and Technology course is not possible only by enabling students to attain information necessary for lifelong learning through teaching the scientific process or developing students' only cognitive and kinetic competencies. Although the Science and Technology

course is known to develop students cognitively, it is essential for effective science and technology education to gain the affective competencies that would enable students to have enthusiasm and interest for this lesson, develop positive attitude and acquire the scientific attitude and values. The affective factors provide opportunity to develop positive attitude and values towards the aims and contents of education in addition to the positive contributions to students' success. Moreover, there is a direct relationship between students' affective features and success level (Rennie & Punch, 1991; Oruç, 1993; Paykoç, 1995). In spite of these, the outcomes, which students gain at schools, remain mostly at information and skill levels and the affective competencies are mostly neglected, due to various reasons caused by students, families, school, teachers, equipment and even education systems (Russell, 2004; Griffit & Nguye, 2005). The related studies have also revealed that cognitive learning are centered in the activities at schools; the behaviors related to the affective domain are mostly excluded from the program and their effectiveness are ignored (Bacanlı, 1999; Bilen, 2001; Kılıç, 2002; Akbaş, 2004).

Thus, there is a need to determine at what levels students gain the affective competencies at Science and Technology course and which teaching processes teachers fallow to give these competencies. Teachers and their teaching processes should be investigated because teachers are one of the factors in the neglect of affective factors. The approaches, perspectives also skills and knowledge of teachers, who are the main components in teaching students, are quite important for this issue.

Considering this need, the present study aimed to determine the Science and Technology course teachers' opinions about developing the affective competencies at 6th, 7th and 8th levels, at which some affective competencies such scientific attitude and values should be gained. The following research questions were addressed:

1. What are the teachers' opinions about the significance of Science and Technology courses to develop students' affective competencies?
2. What are the teachers' opinions about the responsibilities of school teachers and administrators for developing affective competencies at Science and Technology course?
3. What are the teachers' opinions about the affective competencies to be gained at the Science and Technology course?
4. What are teachers' opinions about the effectiveness of the Science and Technology education program for developing the students' affective competencies at Science and Technology course?
5. What are the applications that teachers use to develop students' affective competencies at the Science and Technology course?
   5.1. What are the role model behaviors that teachers adapt to develop students' affective competencies at the Science and Technology course?
   5.2. What are the behaviors that teachers use to develop students' affective competencies at the Science and Technology course?
   5.3. What are the methods and techniques that teachers apply to develop students' affective competencies at the Science and Technology course?
   5.4. What are the materials teachers use to develop students' affective competencies at Science and Technology course?
6. What are the activities that teachers implement to develop students' affective competencies at the Science and Technology course?

<div align="center">**Method**</div>

The present study, which aimed to determine the opinions of primary school science and technology teachers about developing students' affective competence, was designed as a qualitative case study. Case study is an empirical research design in which a current phenomenon is studied within a real life context and which is applied when there are not a certain borders between the current content and itself (Patton, 1980) and when there are more than one evidence and data sources (Yin, 1994; Yıldırım & Şimşek, 2005).

Participants

The participants of the study consisted of 19 Science and Technology teachers, who work at the secondary level of the primary school, teach 6th, 7th and 8th years and have at least 5 year experience. The participant teachers work at 14 different state schools. Through appropriate sampling method, the participant teachers were selected. This sampling method is widely adopted at the qualitative research and it covers the individuals who are accessible and appropriate to the study (Fraenkel & Wallen, 1990; Fink, 1995).

The demographic information about the participant teachers in terms of gender and work experience is presented in Figure 1.

Figure 1. The Demographic Information of the Participants

Participant	Work Experience	Gender	Participant	Work Experience	Gender
T1	5 years	Male	Ö11	8 year	Female
T2	8 years	Female	Ö12	5 year	Female
T3	5 years	Female	Ö13	30 year	Male
T4	13 years	Female	Ö14	35 year	Male
T5	7 years	Female	Ö15	19 year	Female
T6	6 years	Female	Ö16	11 year	Male
T7	11 years	Female	Ö17	29 year	Male
T8	17 years	Female	Ö18	5 year	Female
T9	22 years	Male	Ö19	8 year	Female
T10	5 years	Female			

The participant 19 teachers had the work experience ranging from 5 to 35 years. Additionally, nine of the participant teachers had work experience more than 10 years while 10 teachers had 5-9 work experience. In terms of gender variable, six of the teachers were male while 13 were female.

Data Collection

The data of the study was collected through face-to-face semi-structured interviews with the primary school secondary levels Science and Technology teachers between 29 March–18 April 2010. In this process, the appointments from the teachers who were willing volunteer to participate to the study were taken via telephones. After this pre-interview process, an application calendar was arranged and the interviews were conducted at the teachers' schools individually on the arranged dates. Before the interviews, consent forms for their volunteer participation were signed. Additionally, each interview

was recorded again with the permissions of the teachers. The longest interview lasted 59.46 minutes while the shortest was 26.45 minutes long.

Data Collection Instruments

Semi-structured interview forms were used to collect the data of the study. The forms were developed by the researchers. For its validation study, the experts' opinions were asked. Considering these opinions, the final version was prepared after necessary correction and rewording. The final version consists of 10 questions as six main and four sub questions. Some of the questions in the form ask about the teachers' opinions about the significance of affective domain, responsibilities of school and teachers to develop students' affective domains, the effectiveness level of the Science and Technology education programs to develop these competencies and what affective competencies the students have. On the other hand, the rest of the questions in the form are about what kind of activities teachers implement in the Science and Technology course to develop students' affective competencies and through what methods and techniques the students' affective domains are evaluated.

Data Analysis

The collected data was analyzed through content analysis approach on NVivo 8.0. In the content analysis approach, which is also known as the descriptive method, the findings are presented depending on the original data collected from the participants, with the direct quotations. In addition to the systematic analysis in order to establish cause-effect relation between the events and phenomenon, researchers' personal interpretations and evaluations could be involved in the data analysis and interpretation process. The coding, creating the themes and categories, arranging the data according to codes and themes and identifying them and finally interpreting the findings are the main stages of the content analysis. The main aim of these stages is to reach the concepts and the relations among the concepts that could explain the data (Strauss & Corbin, 1990).

In the study, the data from the semi-structured interviews with the Science and Technology teachers were read on NVivo8.0 software package program and then the divide into meaningful parts and the conceptual meaning of each part was examined. In this process, firstly, the parts that form completeness in themselves were coded; then the coded were gathered and examined together the similarities and differences were examined, the interrelated codes were thematized. The last stage of data analysis procedure was to support the emerged themes with direct quotations from the participants.

In order to ensure the reliability of the data, the themes and sub-themes defined by the researchers were presented to the field experts and asked for their appropriateness. Considering the experts' feedback, the necessary arrangements were done, and then presented to a qualitative research expert. The interrater reliability with this expert was calculated as 89%. This proportion was interpreted as reliable (Miles & Huberman, 1994). Additionally, for the internal validity of the study, the collected data were presented to qualitative research experts and necessary arrangements were done according to their feedback.

Findings and Interpretations

The findings on the Science and Technology teachers' opinions about developing the students' affective competencies at the secondary level of the primary school are as follows:

1. **The teachers' opinions about the significance of the Science and Technology course to develop the students' affective competencies**

All the 19 teachers interviewed in the study agreed that developing the affective competencies is important and they stated that they paid attention to this issue. The findings explaining according to what aspects the teachers attached importance for developing the affective competencies are presented in Table 1.

Table 1. The Reasons Why the Teachers Found Developing the Affective
Competencies Important

Themes	(f)
Affective learning influences the science success positively	8
Affective learning is directly related with the daily life	3
Affective learning facilitates students' adaptation to the ever changing world	2
Affective learning plays role in improving students' personal goals and visions	1
Affective competencies is among the main goals of school and education	1
The beliefs about not to train rote-learners	1

Most of the participant teachers agreed that developing affective competencies is important thanks to its positive effect on students' science success, its direct relationship between daily life and its facilitating role for adaptation to the ever changing world. The theme that "Affective learning influence the science success positively" overlaps with the theoretical information about the teaching affective domain. In the related literature, it is emphasized that for learning cognitive and psychomotor domains, the related affective features can be used as effective means (Bacanlı, 1999; Kılıç, 2002; Akbaş, 2004; Demirbaş & Yağbasan, 2006).

Some of the examples related to this issue are as follows:

> "Gaining affective competencies related to the course is a very crucial subject. Firstly, students should be curious, enthusiastic about doing research and engaging with something, they should dream so that cognitive and psychomotor learning can occur." (T8).

> "Yes , I think affective learning of the students is important. Because I think, without enthusiasm to learn something, it is hard to teach students". (T9).

> "It is very significant subject to prepare students for real life. In this context I do not want to restrict students' learning with the lesson or class, they could use what they learn in a real life. I think their affective competencies play an important role to achieve this." (T17).

Considering the findings presented above, it can be claimed that the teachers attached importance to developing the students' affective competencies thanks to some primary reasons such as the significance of these competencies on motivating students to learn, developing the quality of learning and academic success, besides providing opportunity to use learning in daily life without restricting them within class, also learning cognitive and kinetic skills.

2. **The teachers' opinions about the responsibilities and duties of teachers and school administrations to develop the students' affective competencies at the Science and Technology course.**

The participant teachers' opinions about the responsibilities and duties of the school administration about this issue are presented in Table 2; teachers' responsibilities and duties in Table 3:

Table 2. The Teachers' Opinions about the Responsibilities and Duties of Teachers and School
Administrations to Develop the Students' Affective Competencies

Themes	(f)
Providing equipment, teaching materials and constructing technological substructure	9
Preparing the laboratory environment	4
Supporting and Motivating the teacher designed activities	4
Proving financial support to the planned activities	2

During the process of developing students' affective competencies, the teachers considered that the school administrations should take charge of responsibilities such as "providing equipment, teaching material and sub-structure support; preparing the laboratory environment; supporting the teachers' activities designed for this purpose and providing the financial support to the activities".

Some opinions of the teachers about this issue are as follows:

"I think the school administrations have responsibilities of proving the equipment" (T5).

"Of course, there are some responsibilities and duties of the school and administrations. Providing the equipment and creating the essential teaching-learning environment are among these responsibilities." (T11).

The findings indicated that the teachers defined the responsibilities of the school administrations to develop the students' affective competencies as creating the qualified environment with a rich substructure, supporting the environmental conditions and supporting the teachers' attempts.

Table 3. The Teachers' Opinions about the Responsibilities and Duties of Teachers
to Develop the Students' Affective Competencies

Themes	(f)
Endearing the lesson	9
Endearing the teacher himself	4
Being qualified and equipped at the subject matter	4
Using the laboratory environment effectively	4
Raising the awareness about the significance of the affective domain	4
Self-development	4
Allocating time for students individually	3
Giving importance to students' products	3
Relating the lesson with the daily life within teaching process	2
Motivating students to follow scientific journals	2
Using technology effectively during teaching process	2
Implementing many application activities about the subjects	2
Teaching the problem solving and scientific process	1
Knowing students' features	1
Being hopeful and optimistic about the future	1

The most frequently mentioned opinion about the teachers' responsibilities to develop the students' affective competencies is the necessity to "endear the lesson and teacher himself". Additionally, the themes of using the laboratory effectively, raising the awareness about the significance of the affective domain; self-development; allocating time for students individually; implementing many application activities about the subjects; being hopeful and optimistic about the future are also mentioned.

Some of the quotations explaining the teachers' opinions about the responsibilities and duties of teachers to develop the students' affective competencies are as follows:

> "For a teacher, to gain the affective competencies to the students, it is essential make students love the lesson and enable students to communicate with him easily at least." (T3).

> "It is a precondition to endear the lesson and him." (T8).

When the teachers' these opinions were examined, it was observed that the quality of communication between the teachers, as role models, and student and a democratic class environment supported with love and respect; also students' perceptions about the teacher have important roles in developing students' affective competencies. According to the participant teachers, the teachers' competencies about the subject matter, quality of learning environment and adapted teaching approach, methods and techniques are some of the variables that could influence the development of affective competencies. These findings are consistent with the similar findings of the related studies in literature (Pajares, 1992; Nussbaum, 1992; Walls et al, 2002; Richmond & McCroskey, 2006).

3. The teachers' opinions about the affective competencies to be developed at the Science and Technology course

The teachers' opinions about what affective competencies should be developed at the Science and Technology course are given in Table 4.

Table 4. The Teachers' Opinions about the Affective Competencies to Be Developed at the Science and Technology Course

Themes	(f)
Questioning	7
Establishing cause-effect relationship	6
Having curiosity	5
Transferring learning to daily life	5
Developing self-confidence	4
Doing research	3
Having responsibility	3
Problem solving	2
Depending on the reality	2
Being open-minded	2
Valuing the science	1
Time-management	1

As seen in table 4, the opinions about the affective competencies that should be developed by the teachers at the Science and Technology course were gathered most frequently under the themes of "questioning; establishing the cause-effect relationship; having curiosity; transferring to the daily life". In addition, the teachers reported that some scientific attitudes and values such as the development of self-confidence; doing research; problem-solving; open-mindedness should be developed for the affective competencies.

> "Maybe the most important one is the questioning skill. Because when students get away from searching something, they become easily persuaded. The individual who does not question can be persuaded/fooled easily." (T3).

> "…he should know himself then the environment…." (T12)

> "…he should think why the sky is blue, I don't know, well, he should think such things more scientifically and establish the cause-effect relations… (T19).

When these findings are examined, it could be claimed that some of the teachers' opinions about the issue (transferring learning to the daily life; establishing cause-effect relationship; doing research; time management etc.) are not related to the affective domain exactly but they could be defined as skills. On the other hand, it was observed that the teachers did not mention about the scientific attitude and values such as "caring about the creativity; accepting the change of the thoughts; considering the possibility in judgments; being enthusiastic about knowing and understanding; not giving up in case of failure, modesty; honesty; listening carefully; having respect to self and environment; having self-discipline (Bıkmaz, 2001). The reason underlying this finding can be that teachers do not have enough knowledge about the scientific attitude and values to be developed at the Science and Technology course, additionally; there are not enough explanations about this issue at the Science and Technology education program.

4. The teachers' opinions about the effectiveness of the primary school Science and Technology education programs to develop the students' affective competencies at the course.

The teachers' opinions about the effectiveness of the primary school Science and Technology education programs to develop the affective competencies are given in Table 5.

Table 5. The Teachers' Opinions about the Effectiveness of the Primary School Science and Technology Education Programs to Develop the Affective Competencies

Themes	(f)
The aspects of program considered as adequate	**40**
Proving effective learning	12
Being open, comprehensible and fun	7
Being related to the daily life	6
Intriguing activities	6
Encouraging students for research	2
Encouraging students to question	2
Encouraging students for critical thinking	1
Being appropriate to the universal standards	1
Satisfying the need for private tutorials for the placement test	1
Raising the responsibility consciousness	1
Providing information exchange between teacher and student	1

Themes	(f)
The aspects of program considered as inadequate	**6**
Inappropriate to the students' levels	2
High cost while applying the program	1
Difficulty to structure the teaching-learning process to develop the affective competencies	1
Difficulty to structure the measurement-evaluation process to develop the affective competencies	1
Decreasing the authority of teachers at the program	1

As seen in Table 5, the number of the aspects that the teachers found as adequate at the program was more than the number of inadequate aspects. The most frequently opinions expressing the adequate aspects were "providing the effective learning" and "being easily comprehensible and fun, related to the daily life and having intriguing content and activities". When the themes constructed on the basis of the teachers' opinions were examined, it could be stated that the participant teachers agreed on the contributions of the program to the development of affective competencies by facilitating the learning, making the process effective, supporting the entrepreneurship, thinking and question.

> "The old program was only for teachers. Teacher would teach everything, students would understand. But the current program is not so. There are a lot of activities. We do the activities as many as possible and we engage the students. " (T6)

> "Since there are some activities that could prepare them for the future, I find it adequate" (T17)

> "Children start thinking forms their closest ones. This program gives the subject by simplifying to the children's levels, it gains different perspectives. I think there are some activities that engage students within the process, such as pictures, Do you know that parts, research homework at the books." (T10)

According to the teachers, the basic inadequate point of the program to develop the affective competencies was to be inappropriate to the students' levels. Moreover, the high cost of the application of the program; difficulties in structuring the teaching-learning and measurement-evaluation process for developing the affective competencies as well as teachers' ignorance about their incompetency about these issues were also mentioned. The Science and Technology education program emphasizes that the attitudes and values such as "being enthusiastic about learning and understanding; being open-minded, not having prejudices, taking responsibilities" can be gained by motivating students in-class and outside the class group work activities. In addition, it is also stated that the outcomes such as relying on the science, questioning, having self-confidence and fulfilling the responsibilities are coded near the outcomes of the unit within a bracket, so it is suggested that these attitudes and values should be gained in case they are not involved at the unit. This restricted explanation about the teaching-learning process of affective outcomes seems to support the participant teachers' opinions about the inadequate aspects of the program (not structuring the teaching-learning process of affective outcomes).

> "Unfortunately, giving the list of the student outcomes does not mean that the students gain them. The most important thing is how the attitudes and values are involved in the activities..." (Ö3, T3)

One of the striking opinions of the teachers was that the Science and Technology education program decreased the teachers' authorities so they considered this as a limitation for developing the affective

competencies. One of the teachers claimed that the program is inadequate since "it decreases the authority of teachers".

> *"…We could not draw students' attention. We could not motivate. Why? I do not whether it is caused by this environment. At previous years, there was teacher support. Family said that "he is your child. Teach him!" Ok, you can say, "Is there violence? No, there is not but there were no parents' complaints when we set the authority. When parents did not complain, teachers could enter the class as more dominant. Nowadays, there are some students who do not do their homework but you cannot do anything." (T13)*

The idea of a teacher as an authority or dominant figure in the present classes does not overlap with the understanding of teacher competencies, teacher roles, personality features and democratic education. The above mentioned opinion implies that the teacher authority is necessary for developing the affective competencies but this opinion could cause some negative affective competencies. As Gözütok (2008) stated that a teacher, who defends such opinion, could give the values, norms, thoughts and beliefs based on rivalry, obeying the authority, adaptation, no matter what affective competencies are suggested at the program.

5. The teachers' applications at the Science and Technology course to develop affective competencies.

The teachers' opinions about their role-model behaviors, teaching-learning principles for raising the students' interests, used teaching materials, methods and techniques to develop the students' affective competencies are given in Table 6-7-8-9.

5.1. The teachers' role-model behaviors adapted to develop the students' affective competencies at the Science and Technology course

The teachers' opinions about their role-model behaviors to develop the students' affective competencies are given in Table 6.

Table 6. The Teachers' Opinions about their Role-Model Behaviors
to Develop the Students' Affective Competencies

Themes	(f)
Obeying the rules of laboratory	4
Treating every student equally	3
Giving importance to the lesson	2
Being honest	1
Being tidy	1
Being open-minded	1

Regarding the role-model behaviors during the development of the affective competencies, the teachers most frequently emphasized that "they primarily obey the laboratory rules" and "they treat all students equally". Additionally, the teachers explained that they try to be model to the students by giving importance to the lesson, being honest and tidy, also listening to the students and others and respecting them.

> *"When they see that I obey the rules, they respect the rules." (T7)*

> *"Firstly, I try to make them feel that ı love this lesson" (T10)*

> *"…through the method I applied while doing an experiment or an activity, the order of these methods, being tidy and the respect to the materials, I especially give more important to the laboratory materials, I try to make them feel these so that they could do the same." (T3)*

Some of the teachers who were interviewed in the study stated that they became models to the students by telling about their own learning experience.

> *"I give the different examples that are not involved in our books. But it is not a so frequent event but it happens sometimes. Generally, I try to tell about the attitudes about science that I did during my studentship." (T6).*

> *"In fact I am very sorry that I could not feel that I am a teacher her for three years. In my previous school, there was a corner at the hall that was not used, I asked permission to use it form the director. I gave topics to the students there. The students prepared simple projects such as related to global warming and produced small but concrete products. The students became very happy." (T9).*

When the teachers' opinions about this issue was examined, it was seen that the teachers handled the rules in terms of the laboratory context, the activities in the teaching-learning process class environments were more restricted or at least they did not have any role-modeling activities in the class.

5.2. The teachers' behaviors at the Science and Technology course to develop the students' affective competencies

The teachers' opinions about their behaviors at the Science and Technology course to develop the students' affective competencies are presented in Table 7.

Table 7. The Teachers' Behaviors at the Science and Technology Course
to Develop the Students' Affective Competencies

Themes	(f)
Giving reinforcements	8
relating the subject with the daily life	4
Giving responsibility to the students	4
Correcting the students' mistakes without humiliating and teasing	2
Behaving friendly	1
Having empathy with students	1
Using voice effectively	1
Using the students' names	1
Informing about the goals of the lesson	1
Sense of humor	1

To develop the affective competencies at the Science and Technology course, the teachers preferred to use reinforcements when the students show the desired behavior. Then they respectively related the subjects with daily life gave responsibilities to the students, corrected their mistakes without humiliating and teasing with them. In addition, they reported that they behaved the students friendly;

had empathy with them; used voice effectively; used their names and informed about the aims of the lesson, in that way, they contributed to the development of the positive affective competencies.

> *"When I gave examples, mostly I talked about the students who were not interested in the lesson. For example, Mert. The student became more interested and attracted when his name was called." (T1).*

> *"Primarily I create a positive class environment to develop students' positive attitudes towards the lesson: I say some relaxing statements such as 'All of you are brothers, sisters, friends you can make mistakes. You are here to learn, I am not angry at all. There can be mistakes; we are here to learn the correct'" (T10).*

> *"I usually use associations and metaphors of daily life to draw attention and interest" (T12).*

> *"For example, if I appreciate the product of student A and exhibit it, student B wants to his best and to exhibit his product too." (T14).*

On the basis of the teachers' opinions about the issue, it can be interpreted that for the participant teachers, the positive teaching-learning environment is a precondition and determinant factor for developing students' positive attitude towards teacher and lesson. Thus, they preferred to behave in this way.

5.3. The teachers' methods and techniques deigned to develop students' affective competencies at the Science and Technology course

The teaching methods and techniques designed by the teachers for the development of the affective competencies are presented in Table 8:

Table 8. The Teaching Methods and Techniques Designed By the Teachers
for the Development of the Affective Competencies

Themes	(f)
Doing experiments	18
Question-answers	10
Drama	6
Problem-solving	5
Group work	3
Research assignments	3
Project	2
Writing tasks	2
Brainstorming	2
Playing games	2
Student presentations	2
Cooperative learning	1
Case studies	1
Social club work	1
Educational trips	1

To develop the affective competencies, the teachers reported that they often used the methods and techniques of "doing experiments, question-answer, dram and problem-solving". Some of the teachers

who stated to use the technique of doing experiments explained that due to lack of equipment at schools or families economic problems, only teachers did the experiments. Likewise, the teachers expressed that due to the financial problems, there is not any laboratory at schools. On the other hand, some teachers claimed that although there is a budget for this, there is not any laboratory at schools, the schools give much more importance to the achievement at the placement tests more so they had to study for this exam rather than doing the experiments.

> "I complain about the school administration about this issue. If you want I can show you, there is a very small and inadequate laboratory. This school is one of the oldest schools in Eskisehir; I came here with the hope to see a different laboratory…unfortunately I realize that our school did not care about this issue although it has got enough financial funds." (T19).

In addition to the experiments, the teachers explained that they used the methods of brainstorming and case studies, also the techniques of cooperative learning. Moreover, some teachers stated that they gave research assignments since the physical conditions at schools were not appropriate.

> "The most frequently used activity is experiment, we try to teach by enabling student to do and experience on their own" (T9).

> "For example I apply the demonstration experiment, if each group does the experiment, yes it is good but it becomes very noisy. I mean it is necessary to avoid thinking the experiment time as leisure time." (T15).

In order to develop the students' affective competencies, only one of the teachers in the study used the educational trip that could help students observe the process and phenomena at the real environment. This finding is striking. Some of the teachers explained why they did not prefer to use this method as there are not places for educational trips in Eskisehir and they did not have support from school administration and families for this.

> "Children can learn the biography of the scientist when the unit requires but I worked in Ankara previously. We could bring students to METU or Feza Gürsoy Science Park when the unit is suitable. Since we could not do these here, honestly some topics become unclear." (T4).

Considering the findings, it can be claimed that the teachers had abstract and indirect learning-teaching environments with the students instead of direct, concrete effective ones. On the other hand, it is also striking that the teachers explained the reasons of the problems in these environments with school administration and families rather than themselves.

5.4. The materials used by the teachers to develop the students' affective competencies at the Science and Technology course

The materials used by the teachers to develop the affective competencies at the course are presented in Table 9.

Table 9. The materials used by the teachers to develop the affective competencies

Themes	(f)
Banner-posters	2
Scientific journals	2
Biography books of the famous scientists	2
Related news	1
Written materials including related new and interesting information	1

The teachers reported that they mostly used the banner and posters, scientific journals, biography books of the famous scientists to develop the students' affective competencies at the course. Additionally, they also used the related news and written materials including related new and interesting information. As the figures at Table 9 were examined, it was observed that the teachers preferred to use only published and written teaching materials but ignored visual, audio and interactive materials.

> "I hang interesting information on the walls of the laboratory. There are posters everywhere; the importance of water for the Earth, the parts of body, the ingredients of air, how the microbes live…in brief I try to draw their attention" (T3).

> "Including me, all of us gave small financial support for some activities. We buy a Science Kid journal. This increases students' observations, they offer to do this or these. One of the students become very curious about the 'atlas' journal, it is a good development. Another one was subscribed to national geographic journal. This shows the children's curiosity about the issue." (T5).

6. The activities teachers apply to measure and evaluate the students' affective competencies gained at the Science and Technology course

Six of the interviewed teachers stated that they did not make a realistic evaluation to determine the students' affective competencies since they found the explanations about the measurement and evaluation at the program very complicated. Instead, they emphasized that they planned their lessons as more oriented to the success at the placement test so they did not evaluate the affective gains.

> "Frankly speaking, I don' use any evaluation instrument for this purpose. We have seen a lot of evaluation instruments but I mean, nobody understood anything. We have participated to the seminars as well. However, we did not understand anything." (T15).

> "The classes are too crowded. Also, there is not so much at a hand, I mean, it is not so easy to evaluate a student's attitude towards the Science course. The forms do not involve so much realistic things. Honestly, I did not give the questionnaire this year" (T18).

The opinions of teachers, who declared that they evaluated the students' affective gains related to the course, also their instruments and measurement and evaluation techniques are presented in Table 10.

Table 10. The Measurement and Evaluation Techniques Teachers
Used to Evaluate Students' Affective Competencies

Themes	(f)
Observing the in-class performance	8
Scale of In-class Performance Evaluation	7
Self-evaluation Form	4
Peer evaluation Form	3
Student Portfolio	1

The participant teachers explained that they evaluated the students' affective gains related to the Science and Technology course through the observations of the in-class performances and scale of in-class performance evaluation. In addition, the self-evaluation and peer-evaluation forms were some of the instruments that teachers used for the evaluation of the affective gains. On the other hand, one of the participant teachers reported that s/he used student portfolio to evaluate the students' affective gains.

> *"If the portfolio of a student is tidy, it means that she love the Science course. We evaluate this also. We evaluate this in a way." (T1).*

> *"We have evaluation forms at the end of our books. In these forms, although all of them are necessary, I do not consider all, in fact it reveals whether a student made essential plans or not, whether he is interested or not, whether he really searched or not. It becomes very clear, it is clear whether he did it by searching or making it up." (T6).*

Conclusion and Suggestions

- All of the teachers participated in the study agreed that it is every important to gain students the affective competencies at the Science and Technology course so they gave importance to this issue. Most of the participant teachers explained this significance as the affective learning influence the science success positively.

- The themes that the teachers emphasized more about the responsibilities of schools and administrations to develop the students' affective competencies are "providing equipment, creating the laboratory environment, supporting the teachers designed activities". Regarding the teachers' responsibilities and duties about this issue, the themes of "making the lesson enjoyed, endearing teacher himself, being competent at the subject-matter, using the laboratory environment, increasing the awareness about the significance of the affective domain, self-development" are mostly emphasized by the teachers. When the responsibilities of school, administrations and teachers were handled together, it was seen that rather than classrooms, the laboratory environments were accepted as the most suitable places to develop the affective competencies. The reason of this finding is the teachers' belief that the affective skills can be gained better at the application places more effectively.

- The themes that the teachers mostly mentioned are questioning, establishing cause-effect relationship, having curiosity, transferring to the Daily life and developing self-confidence. It drew attention that the themes of transferring to Daily life and time management are not consistent with the related literature. It was also observed that the teachers did not mention about the

scientific process and values such as "critical thinking, creativity, considering the evidence, accepting the changes of thoughts, enthusiasm towards knowing and understanding and not giving up in case of failure". These findings can be explained with the fact that there is not adequate information about the scientific process and values in the Science and Technology education program and these topics are not involved in the in-service trainings of the teachers.

- The aspects of the Science and Technology program that the teachers evaluated as adequate were intriguing contents activities, motivating the students to do research, question, think critically and take responsibilities. On the other hand, the inadequate aspects were 'not structuring the teaching-learning and measurement-evaluation processes for the development of affective competencies.

- The number of the teachers, who stated that the content structure of Science and Technology education program is adequate to gain students the affective competencies, was more than the ones who thought the opposite. The most frequent opinion about its adequacy is "providing an effective learning"; while the most frequent opinion on its inadequacy is "the program is not appropriate to students' levels".

- In order to provide the students' positive affective competencies, the teachers mostly used behaviors such as "giving reinforcement, relating the subjects with the daily lives, giving responsibilities to the students, correcting them without humiliating or teasing".

- The materials and techniques that the teachers applied most frequently were "doing experiments, question-answer techniques, problem solving", on the other they mostly used the materials of banners-posters, scientific journals and biography books of the scientists

- To measure and evaluate the affective competencies of the students, the teachers mostly used in-class observations of student performances and application of scale of in class performance. Additionally, they used self-evaluation form and peer evaluation form to measure and evaluate the students' affective competencies.

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