



Science Anxiety among Failing Students

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ABSTRACT: This study aimed to investigate sources of failing students' science anxiety. The sample, chosen through criterion sampling, was composed of six ninth-grade students who failed at chemistry course. Semi-structured interviews were carried out with these students. The interview questions were related to students' perceptions, experiences and feelings in relation to chemistry courses. During the interviews, a tape recorder was used to gather and record data. Data were subjected to content analysis in which the data were first assigned relevant codes and then themes were determined based these codes. The findings indicated that the students' science anxiety resulted from unpleasant classroom activities, fear of test, perceptions of chemistry, teacher attitudes, and parent attitudes.

Key Words: science learning, science anxiety, failing students, high school

INTRODUCTION

Anxiety has been a popular area of research for many years for psychologists and educators. It may serve to motivate as well as have its greatest adverse effects on the process of thinking and problem solving that the educator is trying to enhance (Travers, 1967 cited in Bayraktar, 1985). Ericson and Gardner (1992) report that anxiety has detrimental effects on students in the classroom. Anxious students are more likely have difficulties in learning.

Science anxiety is a fear or aversion toward science concepts, scientists, and science-related activities (Mallow, 1981). In other words, it is a debilitating interaction of emotions (fear) and cognition (science learning) (Mallow, 1986) because there is a correlation between students' feelings and their ability to understand the subject matter (Udo, Ramsey, Reynolds-Alpert, & Mallow, 2001). The causes of science anxiety might be "past unpleasant experiences in science classes, exposure to science-anxious teachers, lack of role models, gender and racial stereotyping, and the stereotyping of scientists in the popular media" (Udo, Ramsey, & Mallow, 2004; p. 435). In addition, the mismatch between teaching methods used in science courses and students' level of intellectual development might give rise to science anxiety. Students who have science anxiety usually panic in exams in science courses. However, these students may be calm and productive in their non-science courses. With this property, science anxiety differs from general test or performance anxiety (Mallow, 1986).

Many studies indicate that there is an inverse relationship between grades and anxiety. That is, students with high grades have low anxiety and vice versa (Czerniak & Chiarelott, 1985; Westerback, Gonzalez, & Primavera, 1984; Zoller & Ben-Chaim, 1988). Davis (1987) conducted a study to measure anxiety levels among college students enrolled in an introductory chemistry course. He found that the anxiety for chemistry between those students who are successful and those who are less successful become significantly different as a function of time spent in the course. He also found that no significant difference in chemistry anxiety between males and females exists. Yurkowicz (1988) examined the relationships among science anxiety, success in science, and teacher behaviors such as expectation clarity, elitism, and instructional difficulty in 1622 science students from 86 secondary classes and he found that student perceptions of teacher behaviors were related to pupil science anxiety.

Udo et al. (2001) conducted a study to investigate the factors affecting science anxiety (as a follow up study to Mallow's work (1994) and the exposure to one semester of physics as a factor affecting anxiety. The results of their study show that non-science and gender were found as the main contributors to science anxiety. Udo et al. (2004) investigated science anxiety of a cohort

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consisting mostly of non-science majors taking a variety of science courses. They used Science Anxiety Questionnaire as instrument. The results of multiple regression analysis indicate that non-science anxiety is the best predictor of science anxiety; gender is the second predictor of science anxiety. They also found statistically significant levels of science anxiety in humanities and social science students of both males and females, and gender differences in science anxiety. They pointed out that the number of females who had science anxiety were higher than the number of males who had science anxiety.

While there is a good amount of literature on anxiety in general and on ways of reducing anxiety, there are not many studies specifically on the sources of science anxiety. The studies on science anxiety specifically focused on gender difference in science anxiety (e.g. Mallow, 1994; Mallow, Kastrop, Bryant, Hislop, Shefner, & Udo, 2010; Udo et al., 2001; Udo et al., 2004). Particularly, the studies explaining sources of science anxiety in-depth are rare (e.g. Kaya & Cetin, 2012). Therefore, the main purpose of this study is to examine in-depth the sources of science anxiety of the students' who fail in chemistry course. The results of this study might provide insights into what factors are affecting students' science anxiety in the chemistry courses.

METHODS

Design of the Study

This is a phenomenological study within the qualitative research tradition. The purpose of a phenomenological study is to describe specific phenomena experienced by individuals (Bogdan & Biklen, 1998). In this study, the particular phenomenon is science anxiety. The experiences of the failing and anxious students in chemistry courses were studied based on this phenomenon. The students having science anxiety were determined through the use of information received from their teachers of the chemistry courses in schools. In order to determine the factors affecting science anxiety of these students and to reveal how these factors affect science anxiety, interviews were carried out with the students. Qualitative content analysis was used to code the data and arrive at themes explaining the sources of failing students' science anxiety.

Participants

In this study, criterion sampling method was used. Criterion sampling involves selecting all cases that meet some predetermined criteria (Patton, 1990). Firstly, two high schools, a public high school and a private high school, were selected based on their willingness to participate in the study. They were middle-sized schools with number of students approximately 800 for public and 400 for the private school. Students in the public high school mostly came from the middle socio-economic backgrounds, and the private high school mostly served upper middle class students. After selection of the schools, students were selected based on criterion sampling method. While using this method, the criteria were considered as the students who failed in chemistry exams and who were anxious about the chemistry course. To determine the students who had this property, their teachers were interviewed informally. Of the students who volunteered to participate in this study, two students from the private high school and four students from the public high school were selected for this study.

Data Collection

In this study, semi-structured interview was used as a data collection method. Interview is a data-collection technique that involves oral questioning of respondents, either individually or as a group. Firstly, a semi-structured interview schedule was designed by the researchers. The interview questions were formed by considering the topics of science anxiety, the reasons of anxiety etc. The questions in the interview schedule were related to the activities in the class (e.g. What kind of activities do you perform in the class? How do all these activities affect you?), experiences of the students (e.g. Where do you feel yourself more comfortable: in class or in laboratory? Why?), attitude of teachers, the relationships between students in the class, the

feelings of the students during the chemistry courses, homework given to students, attitude of students' parents. There were a total of 12 interview questions. Each interview took about 20 minutes. During the interviews with the students, a tape recorder was used in order to record what the interviewees stated.

Data Analysis

Qualitative content analysis approach involving coding and thematizing was used to analyze the data. Developing a coding system involves searching through the data for regularities and patterns as well as for topics the data cover, and then, writing down words and phrases to represent these topics and patterns. These words and phrases act as coding categories (Bogdan & Biklen, 1998). In line with this process, firstly, data were transcribed. Then the codes were assigned to meaningful data segments in line with the purpose of the study. Codes like "unwillingness to do experiment," "exam anxiety," and "fear of getting low grades" were drawn from the data to organize the sources of failing students' science anxiety. Afterwards, these codes were categorized to arrive at meaningful themes to characterize anxiety patterns of students. Themes like "unpleasant classroom activities" and "fear of test" were produced. Finally, the data were organized under these categories and codes to describe and interpret the sources of failing students' science anxiety in chemistry courses.

RESULTS

The qualitative content analysis has produced five major sources of science anxiety: "unpleasant classroom activities," "fear of test," "perceptions of chemistry," "teacher attitude," and "parent attitude." These themes have served a framework for description and interpretation of the data. The codes under each of these themes were also used to elaborate the participants' perceptions on science anxiety.

"Unpleasant classroom activities," as a source of students' science anxiety, involved perceptions of lecturing, of problem solving activities and of lab experiments. Each of these experiences appears to serve as a potential source of anxiety even though the participants reported different stories about them. One of these experiences is related to lecture-based sessions which influence students' feelings about the course. One participant said that when her teacher lectured, she was bored a lot, and lost her attention. This resulted in anxiety and in return disconnection to the course content. Similarly problem solving activities were reported to be similar in the way they were carried out, and that also caused disconnection to the course among students. Tediousness of the problem solving activities results in loss of interest among students. Disconnection from the session flow appears to cause restlessness among students as well. As a result, these students were labeled as "uninterested" or "inattentive" by the teacher. Students reported experiencing anxiety in lab sessions as well due to a different reason. They were afraid of carrying out experiments since they were not feeling themselves safe in these experiments. For example one participant said that "When we add metal to acid, small explosions take place. That makes me scared." The fear of carrying out experiments or being in the laboratory where the experiments are carried out indicates that students establish a connection between chemistry course and being unsafe personally.

"Fear of test" was found to be another source of science anxiety. It involved the fear of getting low grades and of being unsuccessful, and reactions to science exams such as sweating, shaking, being sad, crying, and feeling his/her heart beating faster. Some participants said that they were afraid of getting low grades from chemistry exams. This fear of being unsuccessful in chemistry course caused to be anxious in chemistry exams. As a result of this anxiety, they were sweating or shaking during the chemistry exams. Furthermore, some students had this test anxiety in a much higher level. One participant who had this anxiety at a high level said that "My heart is beginning to beat faster and I am shaking ..." When the student was anxious during the chemistry exams,

she/he forgot his/her knowledge required for answering the questions in the chemistry exam. That is, student's test anxiety affected his/her cognitive performance in chemistry exams negatively.

"Perceptions of chemistry" as a subject matter also caused anxiety among students resulting in negative attitudes toward chemistry such as perceiving it unnecessary, boring, disliking, difficult, incomprehensible, and unreasonable. In addition, it is full of numbers and formulas, and requires a good deal of memorizing and reasoning. The participants, who had negative attitude toward chemistry, were anxious and bored during chemistry sessions. For example, one participant said that "I feel anxious in chemistry lessons. So, I wish the lesson to end quickly. I see the chemistry course as time-consuming. That is, chemistry is unreasonable in my opinion. Chemistry should not be part of my life..." In addition, while some students perceived chemistry as a course based on reasoning, some perceived it based on memorizing. In both situations, students reported anxiety since they were afraid of not understanding the chemistry subjects or chemistry questions. If a student could not internalize the chemistry subjects or make sense of them, and thought that chemistry was based on reasoning, s/he perceived chemistry as a difficult course. This perception might lead to anxiety in chemistry course. In a same way, if memorizing was difficult for a student and s/he thought that chemistry was based on memorizing the subjects, chemistry was perceived as a difficult course. This perception again caused anxiety in chemistry course. The perception of including numbers and formulas in chemistry made the course difficult for some students. These students were afraid of not only chemistry but also other science courses including formulas, such as physics. For example, one student said that "there are formulas in chemistry and physics courses. The formulas get difficult that course." As a result, perceptions of chemistry and also other science courses affected students' anxiety in those courses.

"Teacher attitude" was also reported as an important reason of students' science anxiety. This theme involved being strict and shouting. If a student had a positive attitude toward the teacher of a course, s/he liked that course and had a positive attitude toward it and vice versa. If a teacher is strict in discipline and inflexible, this caused for students to be anxious or irritated. The behaviors of teachers might affect the student's success and attitude toward the course. Many students said that if his/her teacher shouted in the class, they were afraid of their teacher's behavior. For example one of the participants said that "When the students in class talks or anyone makes anything, my teacher shouts and therefore I get scared." Negative attitude of the teacher during the chemistry sessions appears to cause for the students to be anxious toward the chemistry course.

"Parent attitude" was determined as the last theme concerning students' science anxiety. The expectations of the parents related to studying chemistry and being successful in chemistry might affect the attitude of the student toward chemistry or science courses. For example one participant said that the excessive pressure of his parents affected him negatively, and therefore he was anxious in chemistry courses. When the parents had high expectations about succeeding chemistry from their children, the students became anxious since they want to respond to their parents' expectations. For example, one student mentioned about her friends' situation related this issue. She said that "I have some friends who must be successful in chemistry and other courses because of their parents' attitudes. When they get low grades, everything is forbidden for them..." In addition, the attention of the family was found very important for students to be successful. If a student's parents did not care about his/her lessons, and success or failure in the lessons, this situation might affect him/her in a negative way.

DISCUSSION and CONCLUSIONS

This study attempted to uncover some of the sources of science anxiety through in-depth interviews with students who fail and experience anxiety in chemistry courses. The interviews produced vivid statements about the anxiety students experienced. The sources of science anxiety appear to be related to classroom activities, fear of test, perceptions of chemistry, teacher attitude, and parent attitude.

Among unpleasant activities for the students, lecturing and problem solving activities carried out in class and the experiments carried out in laboratories create a negative attitude toward the chemistry course in the students. During lectures, students get bored while the static and similar nature of problem solving activities causes disconnection among students. Laboratory experiments cause another type of stress for students: fear. Students seem to be withdrawn from experimental activities in labs since they do not feel themselves “safe” in these types of contexts. All these three unpleasant experiences result in withdrawn as well as “bored” and “fearful” students. These results confirmed the earlier studies on classroom and laboratory activities as factors affecting students’ science anxiety (Hobson, 1998; Jegede, 1989). In order to prevent students’ boredom in science classes, students should be more engaged in the lessons. Teachers should ensure that they participate in lessons in an active way. Participating in lessons might help students feel more confident, thus to have more positive attitude and less science anxiety. For this aim classroom activities can be designed based on different teaching methods such as argumentation based science lessons in which students can have a chance to participate in lessons actively (Cetin, Erduran, & Kaya, 2010; Kaya, 2013). For students who have science anxiety because of laboratory experiments, giving students clear directions about the hazards and precautions of the experiments to be performed in the laboratory might be helpful to control negative effects of science anxiety which some students have (Wynstra & Cummings, 1993).

The second major source of anxiety, fear of test, is very common in the “anxiety” literature. Students’ expectations of getting a low grade indicating their low performance in the course is evident in the responses of the students. The literature on anxiety shows an inverse relationship between grades and anxiety (Czerniak & Chiarelott, 1985; Westerback, Gonzalez, & Primavera, 1984; Zoller & Ben-Chaim, 1988). That is, if the student has science anxiety, s/he tends to get low grade in science courses. In this study as well, the students who had a high level of anxiety (as identified by their teachers prior to the study and themselves during the interviews) were among the students who got low grades in science exams. This expectation of getting low grades from the exams results in psychological reactions like sweating, shaking, sadness, crying and fast heartbeats. Teachers can use alternative methods of assessment in order to deal with students’ fear of test. Open-book or open-note tests, projects, learning logs, journals, and science portfolios may be helpful to control students’ science anxiety because these focus on students’ higher order thinking skills rather than memorization (Wynstra & Cummings, 1993).

Perception of the subject area also serves as a source of anxiety. The students with science anxiety appear to find chemistry course as unnecessary, boring, difficult and incomprehensible. Various characteristics of the course such as numbers, formulas, memorization and reasoning are perceived as aspects to fear or to dislike resulting in an increased anxiety for the students. They find memorization difficult, reasoning unsuitable to their way of understanding, number and formulas difficult to deal with. As a result, the natural aspects of the course serve as negative points for the students with anxiety. Some studies in the literature also indicated that science anxiety was related to negative attitudes toward science (Hensley, 1996; Mallow et al., 2010; Westerback & Primavera, 1992). Therefore, teachers should try to increase students’ motivation and make them have more positive attitudes toward science lessons. Thus, students might be more successful in science lessons and they might have more positive attitudes toward science lessons (Cavallo & Laubach, 2001; Koballa & Glynn, 2007; Osborne, Simon, & Collins, 2003). As a result, they can be less anxious in science classes.

Teacher attitude can be a source of anxiety students experience toward learning in chemistry course. When the teacher is not approachable, strict in his/her way of teaching or dealing with students, a source of anxiety for these students is unavoidable. Therefore, teacher’s attitude seems to be contributing to the students’ level of anxiety about the course (Mallow, 1986; Mallow et al., 2010; Yurkewicz, 1988; Westerback & Primavera, 1992). This implicates that students’ science anxiety is partly related to the way teacher behaves and the way students perceive his/her behaviors. Teachers should be careful about their attitudes toward students in science classes

because teachers have an influence on students' perceptions of science (Cavallo & Laubach, 2001).

Finally, parent attitude toward the student's performance in the course can be a source of anxiety for the student. Unreasonably high expectations put the students under stress. On the other hand, a parent who is uninterested in his/her child's performance can also be a source of anxiety since the student can easily be drawn into a state where he/she feels that nobody cares about him/her. In the literature, the parent attitude is reported in terms of its influence on science anxiety of the students (Mallow, 1991).

These results implicate that teachers need to be aware of students' science anxiety and reasons of their science anxiety are of significance in terms of coping with it and increasing students' success in science courses. The understanding of the reasons of science anxiety might also be useful for instructors in designing their lessons. They can consider the potential sources of anxiety and design some experiences for these students to motivate them toward the course. If the instructors are aware of the problems arising from students' science anxiety, they can help students reduce their anxiety and better focus on the course activities and materials. During a lecture, the instructor can help students to overcome the passive approach to the subject through the use of visual materials, asking questions, and organizing activities that require active student involvement.

This study would present some implications for curriculum designers at the central and local levels. First of all, curriculum designers may take into consideration students' perception of chemistry curriculum and find ways to appeal to their interest more through alternative ways of organizing course topics, designing activities that require active student involvement, etc. For example, some student-centered activities based on cooperative learning, learning cycle models, or argumentation can be included in science curriculum. Concepts maps can be given as another example to these alternative ways of course organization (Jegede, Alaiyemola, & Okebukola, 1990). Second, local education directorates can design in-service education seminars for teachers on science anxiety and ways to deal with it. This could help the schools and the teachers recognize students prone to science anxiety and offer them help in dealing with the anxiety.

REFERENCES

- Bayraktar, M. (1985). "The Effect of Feedback Treatments on Math-Anxiety Levels of Sixth Grade Students." Unpublished master thesis, Middle East Technical University, Ankara.
- Bogdan, R. C. & Biklen, S. K. (1998). *Qualitative research for education: An introduction to theory and methods* (3rd Ed.). Needham Heights, MA: Allyn & Bacon.
- Cetin, P. S., Erduran, S. & Kaya, E. (2010). Understanding the nature of chemistry and argumentation: The case of pre-service chemistry teachers. *Kırşehir Üniversitesi Eğitim Fakültesi Dergisi (KEFAD)*, 11(4), 41-59.
- Czerniak, C. & Chiarelott, L. (1985). Science anxiety among elementary school students: equity issues. *Journal of Educational Equity and Leadership*, 5(4), 291-308.
- Davis, G. (1987). "Measuring the science anxiety of college students in an introductory chemistry course." Paper was presented at National meeting of the American Educational Research Association, Washington, D.C.
- Ericson, P. & Gardner, J. (1992). Two longitudinal studies of communication apprehension and its effects on college students' success. *Communication Quarterly*, 40, 127-137.
- Hobson, A. (1998). "Combating science anxiety in the classroom." [Online] Retrieved on 08-June-2011, at URL: <http://www.aps.org/publications/apsnews/199810/anxiety.cfm>
- Jegede, O. (1989). The effect of a metacognitive strategy on students' anxiety and achievement in biology: ERIC Document Reproduction Service, ED313219.

- Jegede, O. J., Alaiyemola, F. F., & Okebukola, P. A. O. (1990). The effect of concept mapping on students' anxiety and achievement in biology. *Journal of Research in Science Teaching*, 27, 951-960.
- Kaya, E. (2013). Argumentation practices in classroom: Pre-service teachers' conceptual understanding of chemical equilibrium. *International Journal of Science Education*, 35(7), 1139-1158.
- Kaya, E. & Cetin, P. S. (2012). Investigation of pre-service chemistry teachers' chemistry laboratory anxiety levels. *International Journal of New Trends in Education and Their Implications*, 3(3), 90-98.
- Mallow, J. (1986). *Science Anxiety*. Clearwater, FL: H&H Publication.
- Mallow, J. (1991). Reading science. *Journal of Reading*, 34, 324-338.
- Mallow, J. (1994). Gender-related science anxiety: A first binational study. *Journal of Education and Technology*, 3, 227-238.
- Mallow, J., Kastrup, H., Bryant, F. B., Hislop, N., Shefner, R., & Udo, M. (2010). Science anxiety, science attitudes, and gender: Interviews from a binational study. *Journal of Science Education and Technology*, 19(4), 356-369.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd Ed.). Newbury Park, Calif: Sage Publications.
- Udo, M. K., Ramsey, G. P., Reynolds-Alpert, S. & Mallow, J. V. (2001). Does physics teaching affect gender-based science anxiety? *Journal of Science Education and Technology*, 10(3), 237-247.
- Udo, M. K., Ramsey, G. P., Reynolds-Alpert, S. & Mallow, J. V. (2004). Science anxiety and gender in students taking general education science courses. *Journal of Science Education and Technology*, 13(4), 435-246.
- Westerback, M. E. & Primavera, L. H. (1992). "A science educator's and a psychologist's perspective on research about science anxiety." *Paper presented at the Annual Meeting of the National Association for Research in Science Teaching*, Boston, MA.
- Westerback, M. E., Gonzalez, C., & Primavera, L. H. (1984). Comparison of anxiety levels of students in introductory earth science and geology courses. *Journal of Research in Science Teaching*, 21(9), 913-929.
- Yurkewicz, W. (1988). "The Relationships among Teacher Behaviors, Science Anxiety, and Success." Unpublished doctoral dissertation, State University of New York at Albany, N.Y.
- Zoller, U. & Ben-Chaim. (1988). Interaction between examination type, anxiety state, and academic achievement in college science: an action oriented research. *Journal of Research in Science Teaching*, 26(1), 65-77.

Başarısız Öğrenciler Arasındaki Fen Kaygısı

ÖZ: Bu çalışma başarısız öğrencilerin fen kaygılarının kaynaklarını araştırmayı hedeflemiştir. Kriteria dayalı örneklem metodu ile seçilen örneklem kimya dersinde başarısız olan 6 dokuzuncu sınıf öğrencisinden oluşmaktadır. Bu öğrencilerin fen kaygılarını etkileyen faktörleri belirlemek amacıyla öğrencilerle yarı yapılandırılmış görüşmeler yapılmıştır. Görüşme soruları öğrencilerin algıları, deneyimleri, kimya dersleri sırasındaki hisleri vb. ile ilgilidir. Görüşmeler sırasında veriler ses kayıt cihazı kullanılarak toplanmış, sonrasında nitel içerik analizi ile analiz edilmiştir. Görüşmeler sırasında verileri toplamak ve kayıt etmek için ses kayıt cihazı kullanılmıştır. Veriler çözümlenmiş ve sonra bu verilere bağlı olarak kodlar ve temalar oluşturulmuştur. Bulgular öğrencilerin fen endişelerinin, sıkıcı sınıf aktiviteleri, test korkusu, kimya algıları, öğretmen tutumları ve aile tutumlarından kaynaklandığını göstermiştir.

Anahtar Kelimeler: fen öğrenimi, fen kaygısı, başarısız öğrenciler, lise

ÖZET

Amaç ve Önem: Kaygı, psikolog ve eğitimcilerin üzerinde yıllardır araştırma yaptıkları popüler bir alandır. Yapılan araştırmalar kaygının, sınıftaki öğrenciler üzerinde olumsuz etkilerinin olduğunu göstermiştir. Fen kaygısı korku ile fen öğrenimi arasındaki zayıflatıcı etkileşim olarak tanımlanabilir. Belirli ölçüde kaygının öğrenme sürecinde yardımcı olabilmesine rağmen, yüksek kaygı fen öğrenmede üst düzey başarıyı engellemektedir. Yapılan birçok araştırma kaygı ile başarı arasında negatif bir ilişki olduğunu ortaya çıkarmıştır. Alan yazında kaygı ve kaygıyı azaltma yolları üzerine birçok araştırma olmasına rağmen, fen kaygısı üzerine çok çalışma yer almamaktadır. Özellikle fen kaygısı ve bunun sebeplerini ayrıntılı olarak açıklayan çalışmalar sınırlı sayıdadır. Fen kaygısı ile ilgili araştırmalar çoğunlukla fen kaygısında cinsiyet farklılıklarına odaklanmıştır. Bu yüzden, bu çalışmanın amacı kimya dersinde başarısız olan öğrencilerin fen kaygılarının kaynaklarını ayrıntılı olarak incelemektir.

Yöntem: Bu çalışma fenomenolojik (olgusal) bir çalışma olarak gerçekleştirilmiştir. Spesifik olgu olarak fen kaygısı incelenmiştir. Bu olguya bağlı olarak, kimya dersindeki başarısız ve kaygılı öğrencilerin deneyimleri araştırılmıştır. Çalışmada kritere dayalı örneklem metodu kullanılmıştır. Öncelikle biri devlet ve diğeri özel olmak üzere iki lise belirlenmiştir. Daha sonra, kimya öğretmenlerinden alınan bilgi yardımıyla, iki tanesi özel liseden, dört tanesi de devlet lisesinden olmak üzere fen kaygısına sahip olan toplam 6 dokuzuncu sınıf öğrencisi seçilmiştir. Bu öğrencilerin fen kaygılarını etkileyen faktörleri belirlemek amacıyla öğrencilerle yarı yapılandırılmış görüşmeler yapılmıştır. Görüşme soruları öğrencilerin deneyimleri, kimya dersleri sırasındaki hisleri vb. ile ilgilidir. Görüşmeler sırasında veriler ses kayıt cihazı kullanılarak toplanmış, sonrasında nitel içerik analizi ile analiz edilmiştir.

Bulgular: Bulgular öğrencilerin fen kaygılarının, sıkıcı sınıf aktiviteleri, test korkusu, kimya algıları, öğretmen tutumları ve aile tutumlarından kaynaklandığını göstermiştir.

Tartışma, Sonuç ve Öneriler: Öğrencilerin fen kaygılarının kaynaklarından biri olan “sıkıcı sınıf aktiviteleri”, düz anlatım algısı, problem çözme algısı ve laboratuvar deneyleri algısını içermektedir. Öğrencilerin derslerde edindikleri tecrübeler onların derse karşı olan duygularını etkilemektedir. Örneğin, öğrencilerin laboratuvar da deney yaparken kendilerini güvende hissetmedikleri için deney yapmaktan korktukları rapor edilmiştir. “Test korkusu” fen kaygısının bir diğer kaynağı olarak saptanmıştır. Test korkusu; düşük not alma, başarısız olma ve sınav sırasında terleme, titreme, ağlama, kalp atışının hızlanması gibi tepkileri içermektedir. “Kimya algıları” da öğrencilerin kaygı kaynaklarından birisidir. Bu algı öğrencilerin kimya dersine karşı dersin gereksiz, sıkıcı, zor ve mantıksız olduğunu düşünme gibi negatif tutumlara sahip olmaları ile sonuçlanmaktadır. Bir öğrenci kimya konularını içselleştiremez ya da anlamlandıramazsa kimya dersini zor olarak algılamaktadır. Bu algı da öğrencinin kimya dersinde kaygı duymasına sebep olmaktadır. “Öğretmen tutumları” fen kaygısının önemli nedenlerinden birisi olarak belirlenmiştir. Bir öğrenci dersin öğretmenine karşı pozitif bir tutuma sahipse derse karşı da pozitif bir tutuma sahip olmaktadır. Katı ve esnek olmayan bir tavra sahip bir öğretmen öğrencinin dersle ilgili kaygılı olmasına sebep olmaktadır. “Aile tutumları” öğrencilerin fen kaygılarının bir diğer nedenidir. Ailelerin öğrencilerin kimya dersine çalışmaları ve derste başarılı olmaları ile ilgili beklentileri öğrencilerin kimya ya da diğer fen derslerine karşı tutumlarını etkileyebilmektedir. Tüm bu sonuçlar, öğretmenlerin öğrencilerinin fen kaygılarının ve bunun nedenlerinin farkında olmalarının bununla başa çıkma ve fen derslerindeki başarıyı artırma açısından önemli olduğunu göstermektedir. Fen kaygısının nedenlerinin anlaşılması, öğretmenlerin derslerini tasarlamaları açısından da faydalıdır. Bu bağlamda bu çalışma, merkezi ve yerel düzeydeki eğitim program tasarımcılarına da ışık tutacaktır.