THE EFFECT OF FIELD TRIP ORIENTED INSTRUCTION ON NINTH GRADE STUDENTS' ACHIEVEMENT IN ANIMAL DIVERSITY UNIT, CONTINUING AND ACADEMIC MOTIVATION

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ABSTRACT

THE EFFECT OF FIELD TRIP ORIENTED INSTRUCTION ON NINTH GRADE STUDENTS' ACHIEVEMENT IN ANIMAL DIVERSITY UNIT, CONTINUING AND ACADEMIC MOTIVATION

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The purpose of this study was to investigate the effect of field trip oriented instruction on 9th grade students' achievement related to animal diversity unit, and continuing and academic motivation. One control group with 34 students and one experimental group with 53 students, total 87 students from two different private high schools in Ankara were the sample of this study. A field trip to a zoo conducted with experimental group and traditional biology instruction were administrated to control group. The Animal Diversity Achievement Test (ADAT), self report questionnaire measuring continuing motivation to learn biology (CMTLBS), and

self report survey about academic motivation (AMS) were administered before and after the field trip to students in both groups. During the field trip, dialogues among

students were recorded in order to be analyzed as qualitative data. At the end of the field trip, semi-structured interviews with students from experimental group were conducted. The quantitative data were analyzed by using Univariate Analysis of Variance (ANOVA) and Multivariate Analysis of Variance (MANOVA). Dialog Inquiry Method were used to obtain relevant information from recorded dialogues during field trip. The results revealed that the field trip oriented instruction was superior to traditional approach on students' both continuing and academic motivation, as well as achievement on animal diversity unit on animal diversity unit. In addition, dialogues among students reveal that socio-cultural interaction was promoting learning during field trip. The interview results showed field trip oriented instruction motivated students positively to continue to learn biology in future.

Keywords: Field trip oriented instruction, academic motivation, continuing motivation to learn biology, dialogic inquiry, biology education, 9^{th} grade students

ÖZ

GEZİ TABANLI ÖĞRETİMİN DOKUZUNCU SINIF ÖĞRENCİLERİNİN HAYVAN ÇEŞİTLİLİĞİ KONUSUNDAKİ BAŞARISINA, SÜREGELEN VE AKADEMİK MOTİVASYONUNA ETKİSİ

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Bu araştırmanın amacı, gezi tabanlı öğretimin dokuzuncu sınıf biyoloji öğrencilerinin biyoloji dersinin hayvan çeşitliliği konusu ile ilgili biyoloji başarısı, süregelen motivasyonları ve akademik motivasyonları üzerindeki etkisini incelemektir. Ankara'da bulunan iki özel okulda okuyan toplam 87 9. sınıf öğrencisi bu araştırmanın örneklemini oluşturmaktadır. Örneklem 34 öğrenciden oluşan bir kontrol grubu ve 53 öğrenciden oluşan deney grubu içermektedir. Deney grubu, hayvan çeşitliliği konusunu hayvanat bahçesine yapılan bir okul gezisi ile işlerken, kontrol grubu aynı konuyu geleneksel biyoloji öğretim yaklaşımı kullanılarak

işlemiştir. Biyoloji bilgi testi, süregelen motivasyonu ölçen anket, ve akademik motivasyonu ölçen anket geziden önce ve sonra nicel veri elde edilmesi amacı ile uygulanmıştır. Gezi sırasında deney grubundaki öğrenciler arasındaki diyaloglar, nicel veri elde edilmesi amacıyla kaydedilmiştir. Gezi sonunda deney grubundan üç öğrenci ile yarı-yapılandırılmış görüşmeler yapılmıştır. Araştırmadan elde edilen nicel veriler, Tek Değişkenli Varyans Analiz (ANOVA) ve Çok Değişkenli Varyans Analiz (MANOVA) yöntemleri kullanılarak incelenmiştir. Diyalog İnceleme Metodu, gezi sırasında öğrenciler arasındaki diyalogları analiz etmek amacıyla kullanılmıştır. Sonuçta, geleneksel yönteme kıyasla, gezi tabanlı öğretimin öğrencilerin süregelen ve akademik motivasyonları, ve bununla beraber biyoloji başarıları üstünde daha etkili olduğu bulunmuştur. Ayrıca, gezi sırasında öğrenciler arasındaki diyalogların incelenmesi, gezi sırasında oluşan sosyokültürel iletişimin öğrenme üstüne pozitif etkisi olduğunu ortaya koymuştur. Görüşme sonuçları, gezi tabanlı öğretimin öğrencilerin gelecekte biyoloji öğrenmeyi sürdürmeleri konusunda motive ettiğini göstermiştir.

Anahtar kelimeler: gezi tabanlı öğretim, akademik motivasyon, biyoloji öğrenmede süregelen motivasyon, diyalog analizi, biyoloji eğitimi, 9. sınıf öğrencileri

To My Gürk and İzmir

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LIST OF ABBREVIATIONS

CMTLBS : Continuing Motivation to Learn Biology Survey

ADAT : Animal Diversity Achievement Test

AMS : Academic Motivation Survey

PASW : Predictive Analysis Software

IMTK : Intrinsic Motivation to Know

IMTA : Intrinsic Motivation Towards Accomplishment

IMES : Intrinsic Motivation to Experience Stimulation

EMID : Extrinsic Motivation Identified

EMIN : Extrinsic Motivation Introjected

EMER : Extrinsic Motivation External Regulation

AMOT : Amotivation

ANOVA : Analysis of Variance

MANOVA : Multivariate Analysis of Variance

CG : Control Group

EG : Experimental Group

RDS : Representative Dialogic Segment

CHAPTER 1

INTRODUCTION

While many educational philosophies come and go over time, learning outside of the classroom is not a recent phenomenon. The value of learning by doing and learning via experience through out-of-school instruction are underestimated among educators, although research has revealed that field trips could be effective on students learning (Falk, 1983; Koran et al., 1989; Tofield et al., 2003). A visit to a zoo might be enough to create passion and dedication to the subject area for some students. In addition, unlike extrinsicly motivating institutions such as schools, out-of-school learning motivates students via intrinsic motivation (Csikszentmihalyi and Hermanson, 1999). Many teachers agree that experiential learning outside of the traditional classroom offers an important variation to the student's learning, although the effect of the trip mainly effective. (Melber, 2008). The major role of out-of-school learning is to maintain an experience with real life situations (Orion, 1993).

The educational objective of field trips to zoos could be mainly to create a broaden understanding of biodiversity, and mainly animal diversity (Patrick and Tunnicliffe, 2013; Whitehead, 1995). Animal diversity is one of the most important units of biology, since it creates a base line of evolution, medicine, population

genetics, molecular genetics and biological systems (Hellden and Hellden, 2008; Magntom and Hellden, 2007; Slingsby, 2011, Dobzhansky, 1973; Silbia, Andreda and Caldeira, 2014). Students with better conceptualization of biodiversity also bear awareness about environmental conservation and sustainability (Weelie and Wals, 2002; Barker and Elliot, 2000; Maglia and Leopold, 2002). Patrick and Tunnicliffe (2013) proposed that field trips to zoos are important educational activities to create a better understanding of biodiversity. In order to raise a generation with good biological understanding, then, in turn, requires a generation with proper understanding of biodiversity. Using field trips to zoos as a part of school curriculum might serve this purpose.

In addition to content related issues about biological sciences, as Hidi and Harackiewicz (2000) proposed, no one can deny that the universal goal for people in the field of education is also having intrinsically motivated students. Intrinsic motivation was proposed by Deci and Ryan (1985, 1991) within the context of Self-Determination Theory as the highest level of motivation that students' need. Another motivational construct "continuing motivation" was also valuable psychological trait. Continuing motivation is eagerness to come back to and pursue working on subjects in an out-of-school environment that was received in school (Maehr, 1976). Students with intrinsic and continuing motivation were reported to be more academically successful and had chance to proceed on learning school related subjects in the future (Toprac, 2008; Malouf, 1987; Maehr, 1976). In many studies, field trips to non-formal learning institutions could motivate students on school related subjects (Ash, 2003; Crowley and Galco, 2001; Crowley et al., 2001; Ellenborgen, 2002; Falk and Dierking, 1992). However, the effect of school trip on continuing motivation and academic motivation was not studied before.

In addition to motivational treats, field trip itself has a positive effect on academic achievement (Bozdogan and Yalçın, 2009; Doğan, Çavuş and Güngören,

2011; Nundy, 1999). In addition, since the out-of-school learning motivates students intrinsically, the motivated students' academic achievement also effected positively. Motivation, in general, was reported to be one of the important predictors for academic achievement (Kadıoğlu and Uzuntiryaki, 2008; Eryılmaz, Yıldız and Akın, 2011; Akbaş and Kan, 2007; Devetak and Glazar, 2010).

At this point, embedding out-of-school experiences into the school learning would be a wise decision to increase students' academic and continuing motivation, and thus academic achievement. School trips can help teachers to foster motivated students towards science, specifically in the field of animal diversity. The effect of school trips on students' learning and motivation has been investigated by many researchers (Falk, 1983; Marshdoyle et al., 1982). However, academic motivation and continuing motivation is a new concept in this area. In this particular study, main goal is to create a new path using continuing and academic motivation as a main construct. The effect of field trip oriented instruction on 9^{th} grade students' achievement related to animal diversity unit, continuing motivation and academic motivation were investigated. The social impact of the field trip via analysis of dialogs among students during the trip was also investigated.

1.1 The Main Problems and Sub- Problems

1.1.1 The Main Problems

Main Problem 1

What is the effect of field trip oriented instruction on 9th grade students' achievement in units of animal diversity and continuing motivation, when compared to traditional biology instruction?

Main Problem 2

What is the effect of field trip oriented instruction on 9th grade students' academic motivational factors (Intrinsic motivation: To Know, Intrinsic Motivation: Toward Accomplishment, Intrinsic Motivation: To Experience Stimulation, Extrinsic Motivation: Identified, Extrinsic Motivation: Introjected, Extrinsic Motivation: External Regulation and Amotivation), when compared to traditional biology instruction?

Main Problem 3

What is the effect of social dialogues among students during the field trip on 9th grade students' achievement in units of animal diversity and continuing motivation?

Main Problem 4

How students perceive field trip oriented instruction with respect to its effect on biology learning?

1.1.2 The Sub-Problems

Sub-Problem 1

Is there a significant population mean difference between groups exposed to field trip oriented instruction and traditionally designed biology instruction with respect to achievement related to animal diversity unit?

Sub-Problem 2

Is there a significant population mean difference between groups exposed to field trip oriented instruction and traditionally designed biology instruction with respect to continuing motivation?

Sub-Problem 3

Is there a significant population mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' intrinsic motivation: to know (IMTK)?

Sub-Problem 4

Is there a significant population mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' intrinsic motivation: toward accomplishment (IMTA)?

Sub-Problem 5

Is there a significant population mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' intrinsic motivation: to experience stimulation (IMES)?

Sub-Problem 6

Is there a significant population mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students', extrinsic motivation: identified (EMID)?

Sub-Problem 7

Is there a significant population mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' extrinsic motivation: Introjected (EMIN)?

Sub-Problem 8

Is there a significant population mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' extrinsic motivation: external regulation (EMER)?

Sub-Problem 9

Is there a significant population mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' Amotivation (AMOT)?

1.1.3 Hypotheses

Null Hypothesis 1

There is no significant mean difference between groups exposed to field trip oriented instruction and traditionally designed biology instruction with respect to achievement related to animal diversity chapter.

Null Hypothesis 2

There is no significant mean difference between groups exposed to field trip oriented instruction and traditionally designed biology instruction with respect to continuing motivation.

Null Hypothesis 3

There is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' intrinsic motivation: to know (IMTK).

Null Hypothesis 4

There is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' intrinsic motivation: toward accomplishment (IMTA).

Null Hypothesis 5

There is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' intrinsic motivation: to experience stimulation (IMES).

Null Hypothesis 6

There is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' extrinsic motivation: identified (EMID).

Null Hypothesis 7

There is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' extrinsic motivation: Introjected (EMIN).

Null Hypothesis 8

There is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' extrinsic motivation: external regulation (EMER).

Null Hypothesis 9

There is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' amotivation (AMOT).

1.2 Definition of Important Terms

The constitutive and operational definitions of important terms were given in this section.

Field Trip: A visit to out-of-school environments in order to observe the real world.

Continuing Motivation: Continuing motivation is willingness to work again on subjects in out-of-school environment that was proposed in school environment at the beginning (Maehr, 1976).

Academic Motivation Scale: A scale that was originally designed by Valerand et al. (1989) which measures intrinsic motivation's sub-constructs, as well as extrinsic motivation and amotivation.

Intrinsic Motivation: Intrinsic Motivation is to perform a task in order to have fun. (Deci and Ryan, 1985).

Extrinsic Motivation: Extrinsic Motivation is mainly a type of motivation that is not for the ones sake but in order to reach to an end (Deci, 1975).

Amotivation: If an individual cannot connect their actions with the outcomes, the amotivation construct is said to be on action (Deci, 1975; Deci and Ryan, 1985).

Traditional Instruction: An instruction in which the teacher is the main authority and gives a lecture about the chapter and students listen.

Social Constructivism: Focus on the importance of social interaction in learning (Derry, 1999).

Self-Determination Theory: Self-Determination Theory is motivational theory that proposed a continuum to explain the degree to which external regulation has been internalized (Deci and Ryan, 1985).

1 .3 Significance of the Study

Biology is said to be the science of 21st century. The improvement in the research about genetic engineering and biotechnology has highly increased in the last two decades. Environmental sustainability, medical research, genetic engineering, research in food supplies are hot topics in the area of science and politics; and they all require a good understanding of biology. In order to comprehend the science of living organisms, one should have flawless knowledge about biodiversity. Only with the full understanding of this concept, one could grow

the general biological thought (Mayr, 1982) and it provides a base for the understanding of evolution (Kellert, 1996). Baring the basic understanding of biological diversity was reported to lead a better conceptualization of other biological concepts such as evolution, systems, microbiology and genetics (Dobzhansky, 1973; Silva, Andrade and Caldeira, 2014). Understanding of biodiversity is also one of the prerequisites for personal awareness about sustainability and environmental conservation (Weelie and Wals, 2002; Barker and Elliot, 2000; Maglia and Leopold, 2002). In conclusion, to have a voice in the area of science and industry, countries should raise high numbers of students who are interested in the area of biology and specifically have students with good understanding of biological diversity. But is this the real situation?

Unfortunately in starting from the middle school and till the end of high school, instruction in school is referred as boring (Toprac, 2008) and in a variety of settings researchers indicated that students' intrinsic motivation decrease when the grade of the student has increased (Cordova and Lepper, 1996). Having intrinsically motivated students, i.e. with the students bearing inner willingness in studying and completing successfully of a task (Graham and Weiner, 1996), continue learning without any school requirement is an universal goal for people in the field of education (Hidi and Harackiewicz, 2000). However, lack of motivation is the major reason for the failure in the school learning (Hidi and Harackiewicz, 2000). When science is in the center, the motivational problems are more obvious (Tuan, Chin, and Shieh, 2005). It was proposed that when school level increases, intrinsic motivation to learn science declines (Eccles and Wigfield, 2002; Krapp, 2002; Lepper, Corpus, and Iyengar, 2005; Stake and Mares, 2001), mostly from age 11 to secondary school (Osborne, Simon, and Collins, 2003).

The situation is similar in Turkey. Recent research indicated that Turkish high school students have moderate science attitudes (Telli, Cakiroglu and Brok,

2006) and majority of the students study biology in high school just to get good grades, which implies that extrinsic motivation is the main reason to study biology (Yumusak, Sungur and Cakiroglu, 2007). This study also revealed that students are most favorable about enjoyment and inquiry in biology, and least favorable about the prospect biology has for their career.

However, the situation is different when learning outside of school is considered. Learning outside of the school often referred in various studies with different names: informal learning, nonformal learning, informal education, free-choice learning, learning in out-of-school contexts or environments (Dierking et al., 2003; Walton, 2000). Whatever name was given, the common aspects of learning outside of school were commonly listed as voluntary, open curriculum, nonevaluative noncompetitive activities and heterogeneous social interaction (Hein, 1998; Falk, Koran and Dierking, 1986).

Unlike school learning, learning outside of school can provide students more enjoyable and motivating learning activities. The listed characteristics of informal learning can promote highly motivational learning experiences. School trips to informal learning environments can create interesting learning experiences (Glynn and Duit, 1995). In addition, they can observe scientific concepts in real life situations (Griffiths and Moon, 2000; Tytler, 2002, Çimer, 2007).

Furthermore, Hodder (1997) and Wellington (1998) were found that informal learning contributes to formal learning in various aspects. The results of the study which was focused on the science center visits and attitudes toward science revealed significant differences between experimental and control groups (Finson and Enochs, 1987).

However, few studies were engaged in the investigation of field trips and its role on motivation and achievement. Packer and Ballantyne (2002) claimed that a

work on motivation may create a theoretical framework for out-of-school learning. In this study, it was hoped that a field trip can improve achievement in animal diversity unit, increase academic motivation in biology, and promote continuing motivation to learn biology.

Continuing motivation is an important psychological construct because it fits with today's world's requirements which are continuous learning via all kinds of media. Furthermore, achievement of students is effected by how they prefer to apply the school context in informal environments. (Toprac, 2008). Thus, the investigation of continuing motivation levels of students will reveal the effect of students' background on interest in biology. One way of creating continuing motivation to learn biology is with the help of field trips.

Academic Motivation Scale (Vallerand et. al., 1989) measures three different types of motivation: intrinsic motivation, extrinsic motivation and amotivation which were proposed in the Deci and Ryan's (1987) Self-Determination Theory. Since it was proposed that intrinsically motivated students' academic achievement was higher than non-motivated students (Bozdogan and Yalçın, 2009; Doğan, Çavuş and Güngören, 2011; Nundy, 1999), the level of impact of field trip oriented instruction on students' three types of motivational patterns and achievement would reveal an in-depth investigation of the effect of field trip on different motivational treats, in addition to continuing motivation.

To sum up, science is important in order to go forward as a country. Unfortunately, Turkey is not an active country in motivating students in science related concepts and does not have university students who will choose biology as an occupation. The intrinsic and continuing motivation to learn biology could be increased by out-of-school learning environments. Unfortunately, both the effectiveness of field trips in classroom learning and continuing motivation are not

researched frequently. That was the reason why, the effect of field trip oriented instruction on 9th grade students' achievement with respect to animal diversity unit, continuing motivation and academic motivation was investigated in this particular study

CHAPTER 2

LITERATURE REVIEW

This chapter provides a theoretical framework for this study. The chapter of review of literature was divided into fallowing categories: motivation, learning outside of school, social constructivism and socio-cultural theory, and summary of the findings of reviewed literature.

2.1 Motivation

Motivation is explained as an important construct in learning (Lepper et al., 2005). It has various definitions, one of which given as process of goal-directed behavior (Schunk, 2000). Schunk explains that motivation reveals knowledge about students' behaviors. He concluded that motivated students do not stop working due to difficulties but they try more to accomplish. In addition, motivated students engage in

activities such as reading books, solving problems, and working on computer projects in their free time.

Motivation is a goal oriented process (Schunk, Meece and Pintrich, 2014). When this explanation is examined deeply, the first construct of motivation should be explained as 'process'. Since it is a process, there is no end-product to observe, rather, it persists in the center of the actions. In addition, motivation has a 'goal', which means a direction for specific activities. Motivation requires 'activities', and these activities could be physical or mental. Finally, these activities are 'instigated and sustained', it means motivation helps its bearer to overcome problems easier and makes him/her carry itself throughout the whole process (Schunk, Meece and Pintrich, 2014).

Glynn et al. (2005) explained motivation as an intrinsic situation that directs behavior. In the study of Huang and Waxman (1995), different motivated students have different understanding of learning. Kobala and Glynn (2007) stated that if science is taught in an effective way, it could increase students' motivation to learn.

Anderman and Young (1994) explained that when grade level increases, motivation in scientific concepts decreases. The study of Zusho, Pintrich and Copolla (2003) also revealed the similar pattern. In the early adolescence period, this decrease is more noticeable.

Tuan, Chin and Sheih (2005) investigated 8^{th} grade students' motivation outcomes after implementing 40 hours inquiry-base teaching. The findings of this study revealed that inquiry-based instruction increased students' motivation significantly. Results indicated that inquiry-based science learning can help students to be motivated about scientific concepts.

Kadıoğlu and Uzuntiryaki (2008) examined motivational factors on chemistry achievement with 359 tenth grade secondary school students. An

achievement test and a questionnaire about motivational strategies for learning were administrated. The results revealed that 11% of variance in chemistry achievement was explained by intrinsic goal orientation, self-efficacy for learning and performance and test anxiety.

A study of Eryılmaz, Yıldız and Akın (2011) examined the interaction of students' attitudes towards physics laboratories and their motivations. Results revealed that students with positive attitudes towards physics laboratory had high motivation for class engagement.

In the study of Akbaş and Kan (2007), the impact of motivation and anxiety on secondary school students' chemistry achievement were investigated. 422 females and 397 males, total 819 secondary school students were administrated with two questionnaires. One of the questionnaires was a motivation scale and the other one was a anxiety scale. The results revealed that there was no significant mean difference when gender is considered with respect to motivation for chemistry lessons.

One of the recent studies, done by Devetak and Glazar (2010), studied the relationship between students' intrinsic motivation for learning chemistry, formal reasoning abilities and chemistry knowledge. The findings indicated that there was a significant correlation between students' intrinsic motivation, formal reasoning abilities and chemical knowledge.

Although motivation is seemed to be valuable construct to define the students' eagerness to learn, different motivational theories and approaches were emerged in the educational literature. Two of them provided a framework for this particular research. One of them is Continuing Motivation proposed by Maehr (1976), and the other is Self-Determination Theory (Deci and Ryan, 1985) which is measured by Academic Motivation Scale (Vallerand et al., 1993). The fallowing parts will give detailed information about these particular motivational approaches.

2.1.1 Continuing Motivation

Continuing motivation is explained as the eagerness to work school content in a out-of-school environment that was exposed in school in the first place (Maehr, 1976). Continuing motivation could be explained as intrinsic. Students with continuing motivation want to continue on learning also in future (Sorensen and Maehr, 1976).

Malouf (1987) worked on the effects of playing instructional computer games on motivation to engage in a fallowing academic task. The results revealed that computer games significantly increase students' motivation.

In line with the presented researches, continuing motivation is a valuable construct to explain students' eagerness to continue on learning the academic subjects without any school requirement. Another motivational theory, Self-Determination Theory explains students' motivational derives in a more detailed manner.

2.1.2 Academic Motivation and Self- Determination Theory

Motivational theorists suggested that it was necessary to get an in-depth analysis of students' behavior in education and should include a more detailed way with respect to motivation (Deci and Ryan, 1985; Deci et. al., 1991). In order to fill that gap, Deci and Ryan (1985) proposed a motivational theory as Self-Determination Theory (SDT).

In this motivational approach, autonomous motivation and controlled motivation are important motivational constructs. Autonomy is explaining one's actions at the highest level of reflection (Dworkin, 1988; Gagne and Deci, 2005). On the other hand, being controlled includes acting with a pressure. The use of extrinsic rewards such as tokens or grades was found to cause controlled motivation (Deci, 1971). Intrinsic motivation was described as "prototypically autonomous" (Gagne and Deci, 2005, pp. 334). On the other hand, extrinsic motivation is controlled by extrinsic factors. "I work because my boss is watching" is an example for externally regulated actions. Other type of extrinsic motivation is self-regulated one ("I work because I have to do"). Although the reason for work was internalized, this internalization is not due to intrinsically motivated actions. SDT proposed a continuum to explain how external regulation has been internalized (see Figure 2.1). Internalization is a term refers to three different processes: introjection, identification and integration (Deci and Ryan, 1985; Deci et. al., 1991; Gagne and Deci, 2005). The SDT was summarized in the Figure 1.

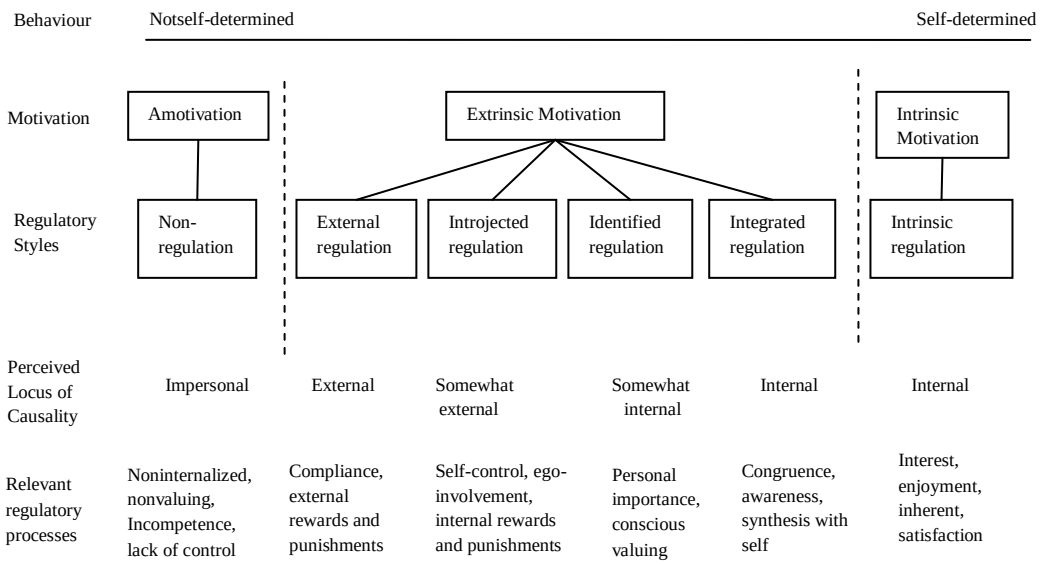


Figure 1 Self-determination continuum.

In Figure 1, the actions were placed in the continuum from not self-determined to self-determined. Amotivation is the lowest level and it is not self determined, it is impersonal. The amotivation derived actions are non-internalized, non-valuing, incompetence and lack of control.

Extrinsic motivation has four types due to regulatory styles. External regulation is in between amotivation and Introjected motivation. The reason for action is external such as external rewards and punishments. Introjected regulation is somewhat external but self-control is in action. In introjected regulated actions, ego is involved. Internal rewards are punishments are the basic motives for these kinds of actions. Identified regulation is somewhat internal due to its personal importance, and conscious valuing. Integrated regulation is the most self-determined action of external motivation. The reason for action is internal, and action includes awareness, synthesis with self and congruence.

Intrinsic motivation derived actions are the most self-determined actions. The reasons for acting are interest, enjoyment, inherent and satisfaction.

Vallerand et. al. (1989) proposed a scale called "Academic Motivation". and The AMS (Vallerand et al., 1992) was created to measure intrinsic, extrinsic, and amotivation.. It measures the three motivational constructs that was presented by self determination theory.

This scale has three sub-scales called "Amotivation", "Intrinsic Motivation" and "External Motivation". Amotivation was described as absence of intrinsic and extrinsic motivation. Intrinsic motivation has three types: To Know (IMTK, to do something for pleasure and satisfaction experienced by learning), To Accomplish Things (IMTA, to do something for pleasure and satisfaction while trying to accomplish things) and To Experience Stimulation (IMES, to do something to experience stimulating sensations). Extrinsic motivation has also three types: External Regulation (EMER, to do something because one is pressured by someone to do it), Introjected Regulation (EMIN, to do something because one pressures him/herself to do it), and Identified Regulation (EMID, to do something because one has decided to do it although it is not fun). As a scale, it ranges from amotivation, to external, introjected and identified regulation and finally intrinsic motivation (Valerand et al., 1993).

Intrinsic Motivation mainly refers to the fact of doing something for itself and the fun and satisfaction due to participation (Deci, 1975; Deci and Ryn, 1985).

Although different types of intrinsic motivation were investigated by researchers, the tripartite taxonomy was proposed by Valerand et al. (1989).

To Know is the first construct of this type of motivation. It relates with several psychological constructs such as curiosity, learning goals, exploration and

internal motivation to learn (Gottfried, 1985; Harter, 1981). Thus, it can be defined as the pleasure and the satisfaction that one experiences while learning.

Toward Accomplishment, on the other hand, studied by developmental psychologists (Harter, 1981). It defined as to be motivated to do something in order to create unique accomplishments (Deci, 1975; Deci and Ryn, 1985).

To Experience Stimulation is the type of intrinsic motivation, and it is useful when someone engages in an activity in order to experience stimulating sensations such as aesthetic experiences, fun, excitement and such (Valerand et al., 1989).

Extrinsic Motivation is mainly a type of motivation that is not for the ones sake but in order to reach to an end. Deci, Ryan and their collogues (1991) proposed three types of external motivation and can be defined on the self-determination scale. From lower to higher levels of self-determination these motivational factors are external regulation, introjection and identification.

External regulation is defined as behaviors that are regulated through external factors such as rewards, tokens and punishments. Grades are the main motivators for this type of external motivation (Deci, 1975; Deci and Ryn, 1985).

In the introjected regulation, the individual internalized the reasons for her or his actions. Although it has a level of internalization, it limited to external situations, thus it is not defined as internal motivation. If a student says "I study because good students should study", he seems to be externally motivated through introjected regulators.

Identification is the closest external motivation factor to the internal motivation. Individual does an action because it is something important to him/her (Deci, 1975; Deci and Ryn, 1985).

If an individual cannot connect their actions with the outcomes, the amotivation construct is said to be on action. The perception of their actions is seem to be out of control. This type of amotivation could end up with the giving up from the academic activities (Deci, 1975; Deci and Ryn, 1985).

The Self-Determination Theory is the theoretical basis for Academic Motivation Scale (AMS), which was used in this particular study. The usage of AMS in different studies would be the fallowing part's subject.

In the study of Cockley (2000) the construct validity was measured. The three types of intrinsic motivation were found that significantly and positively correlated with each other. Three types of extrinsic motivation were significantly and positively correlated too. Amotivation was found to have a strong negative correlation with identified regulation than with any other intrinsic motivation sub-scales.

The study which examined the factor structure of the Academic Motivation Scale (Vallerand et al, 1992) with a United States student population of 263 undergraduate students (aged 19–45 years) supported 7-factor structure of the scale (Cockley, 2001).

In another study, the measurement and latent construct invariance of the Academic Motivation Scale across both gender and time were investigated (Grauzet, Otis and Pelletier, 2006). It was a longitudinal project conducted in an French speaking catholic school in USA. Over a periods of 3 years (from 2001 and 2003), 322 boys and 321 girls in 8^{th}, 9^{th} and 10^{th} grades completed the French version of AMS. The results of this study provided support cross-gender metric invariance meaning that the scale can be used to define gender invariance as well as academic motivational invariance.

As indicated in the literature, motivation is one of the most important constructs that effect human learning (Gottfried, 1985; Lepper, Corpus, and Iyengar, 2005; Schunk, 2000). Continuing motivation is crucial because learning is continuous and not limited to school (Maehr, 1976). If higher continuing motivation contributes to higher academic performance, then students' with higher continuing motivation could insist on learning academic concepts in future. Academic Motivation in which self-determination is described is another important motivational construct in learning. Academic Motivation Scale developed by Valerand et al. (1989) focused on three types of motivation. These in-depth analyzed motivational constructs, especially intrinsic motivational constructs are also extremely important in students' learning. Bearing the importance of motivation in education in mind, one of the most overwhelming questions that educators face is then, how to motivate students to learn academic concepts? One of the answers of educators to that question is out-of-school learning.

2.2 Learning Science Outside of School

Learning outside of the school often referred in various studies with different names: informal learning, non formal learning, informal education, free-choice learning, and learning in out-of-school contexts or environments (Crane et al., 1994; Dierking et al., 2003; Walton, 2000). How out-of-school learning defined depends on the degree of formality (Hofstein and Rosenfeld, 1996), the degree of authority, and the environment (in the buildings or outdoors) (Rickinson et. al. 2004), or the degree of freedom of choice (Falk, 2001). However, the common characteristics of learning outside of school could be underlined as voluntary, open curriculum, non evaluative noncompetitive activities and heterogeneous social interaction (Hein,

1998; Falk, Koran and Dierking, 1986). In another study of Falk and Dierking (2000), out-of-school learning was characterized as a process that is specific for the individual.

The out-of-school learning concept is frequently combined with constructivist educational philosophies (Drivel and Bell, 1986; Duit and Tregust, 1998; Anderson, Lucas and Ginns, 2003; Hein, 1998). The socio-cultural part of the out-of-school learning is also emphasized in various studies (Brown, Collins and Duguid, 1989; Lave and Wenger, 1991; Resnick, Levine and Teasley, 1991) especially when museum learning is the focus (Matusov and Rogoff, 1995; Schauble, Leinhardt and Martin, 1997; Johnston and Rennie, 1995). The studies of the interaction between the visitor groups (families, school groups or among friends) revealed that the conversation between the group members foster the science understanding as well as increases the curiosity and thus, intrinsic motivation (Ash, 2003; Crowley and Galco 2001; Crowley et al., 2001; Ellenborgen, 2002).

Although the main point of each research is different from each other, there is a common understanding about why learning outside of the school is important. The first underlying concept is the fact that learning is a personal process (Rennie, 2007). The second aspect is learning is contextualized, which means learning is not done alone, especially when museum learning is the focus (Matusov and Rogoff, 1995; Schauble, Leinhardt and Martin (1997) suggested that meaning emerges from social interaction and learning is socially contextualized and shaped by physical features of environment. Falk and Dierking (1992) proposed Interactive Experience Model; they refined it in 2000 as Contextual Model of Learning. Three contexts of importance in those settings: Personal Context, Socio-cultural Context, Physical Context. This model also identified 12 critical suites of factors representing elements of three contexts (Rennie, 2007). Personal Context: (1) motivation and expectation, (2) prior knowledge and experience, (3) Prior interests and beliefs, (4) choice and

control. Socio-cultural Context: (1) within group social mediation, (2) facilitated mediation by others, (3) cultural background and upbringing. Physical Context: (1) advance organizers in context, (2) orientation to the physical space, (3) architecture and large scale environmental design, (4) design of exhibits and content of labels, (5) subsequent reinforcing events and experiences outside the museum. The third point of out-of-school context is learning takes time which makes it difficult to measure. Longitudinal studies, examine appropriate variables before, during and after is needed to emphasize this aspect of informal learning.

According to Rennie and McClafferty (1996), although many learning outcomes were reported by various researchers, in order to assess these outcomes, pre-test post-test designs would not be enough. They suggested open-ended questions about what the visitor had learned from the museum visit.

2.2.1 Learning Science from Museums and Zoos

The examination of evolution of museums through the history can reveal the social needs for new generation museum understanding. In 1960s and 1970s, first generation museums mainly focused on collections of various materials (McManus, 1992). In late 1970s, museums changed their content to enhance communication with visitors and these museums were classified as second generation museums with hands on elements. Third generation museums, on the other hand, present exhibits to display not the objects but the scientific ideas and interactivity is being reciprocal (McLean, 1993; McManus, 1992). Museums are perceived as places where people develop personal understanding, have freedom to choose, engage with difficult tasks, autonomous, socially active and have positive feelings (Paris et. al., 1998). The studies on exhibit quality revealed that successful exhibits can motivate visitors

intrinsically by fostering curiosity, confidence, challenge, play, enjoy and communication (Allen, 2004; Perry, 1992). Semper (1990), provided perspective with 4 themes: curiosity and intrinsically motivated learning supported by the research of Csiksentmihalyi and Hermenson (1995), multiple modes of learning developed by Gardner (1995) and Serrel (1990), the importance of play and exploration in learning (Hawkins, 1965), and the existence of different views and levels of knowledge about science and how the world works.

The behaviorist educational philosophies often argue that out-of-school learning cannot be effective because play and learning cannot occur at the same time. However, play is frequently combined with learning in various studies (Garvey, 1991; Mann, 1996; Sylva, Bruner and Genova, 1976; Hutt, 1971). In addition, the effect of museum in learning is difficult to measure because learning does not need to occur in the museum immediately but learning is cumulative. That is the reason why short studies on museum learning often fail but longitudinal studies revealed the effectiveness of out-of-school learning (Falk et al., 2004; Medved and Oatley, 2000; Stevenson, 1991; Anderson, 2003).

Although there is large bodies of literature about the effect of museums on science learning, the research in Natural History Museum in USA revealed that visitors often declare without observing behaviors, non-living animal bodies in exhibitions are not enough (Tunnicliffe 1996; Tunnicliffe, Lucas and Osbourne 1997). It was reported that living specimens bare ecological and environmental massages when compared to museums' non-living specimens. Adelman, Falk and James (2000), concluded that visitors' experiences in National Aquarium in Baltimore enrich their conservation experience. With pre-visit and post-visit interviews, development of visitors' understanding of rare geothermal biological features of a geyser in Yellowstone were reported (Brody, Tomkiewicz and Graves, 2002).

In the study of Bamberger and Tal (2007), degree of freedom of choice were studied in natural history and science museums. After a long time, students remembered their interactions with other students, with museum educator, referring to specific dialogues and topics. It was concluded that limited choice visit served as a scaffold to students' learning. Jarvis and Pell (2005) reached a similar conclusion with the school visit to space center in UK. They found out that students need adult supervising in the vast opportunities of choice in the museum. They concluded that limited visits were more effective than limitless school visits.

Mortensen and Smart (2007) had used worksheets in a different way rather than traditional ways. They have analyzed tasks presented in museum worksheets and found that tasks help students' learning. They summed up that good-balanced freedom of choice with scaffolding had a positive outcome.

DeWitt and Storsdieck (2008) suggested that the museum visits have an impact on affective outcomes such as motivation. They proposed that the researchers should focus on the studies that are investigating affective outcomes of museum visits.

2.2.2 Learning Science from Field Trips

It was explained that the field trips establish direct interaction with concrete subjects (Orion, 1993). Educational literature is rich with field trip investigations and its importance on learning. Field trips can be helpful in education from both a cognitive and affective understanding (Falk, 1983; Koran et al., 1989; Tofield et al., 2003).

Learning in schools is usually motive students by extrinsic factors such as grades. However, out-of-school learning places like zoos and aquariums intrinsically motivate students due to their information presentation nature. Learning by doing, seeing, touching and observing are the valuable effects on visitors' learning (Csikszentmihalyi and Hermanson, 1999). Experiential learning outside of the traditional classroom provides different visions for students during learning experience. Although the contribution of field trips on students' learning are mainly affective, like increasing intrinsic motivation, enjoyment and amusement; these psychological traits in turn increases the academic achievement (Marshdoyle et al., 1982; Melber, 2008).

In the research of Ballantyne and Packer (2002), after the field trip students gave optimist answers about the degree of freedom, learning environment, social interaction, able to feel the nature. It was explained that students found the free choice activities more attractive than structured learning activities.

In the study of Kıyıcı and Yiğit (2010), the effect of field trip to a power plant with collage students on learning outcomes. The student interviews after the field trip indicated that the trip was beneficial because it provided first-hand information, valuable observation and meaningful and lasting learning.

Cengiz and Kabapınar (2011), focused on the effect of field trip to Energy Park on prospective science teachers' learning of science concepts. 30 final year prospective science teachers participated in the study. As an instrument a questionnaire was used. the results indicated that field trip helped prospective teachers to understand scientific concepts such as bio energy and air pollution.

A recent study of Tasdemir, Kartal and Ozdemir (2014), pre-service teachers' views about science centers and museums as out-of-school learning environments were investigated through a case study. Results indicate that pre-service teachers

expressed positive views with regard to the activities related to the science centers and museums.

One of the studies of Bozdogan and Yalçın (2009), the effect of visiting exhibitions and participating in the activities offered by science centers on raising the interest of second level students in primary education in science were investigated. The effect of field trip on academic achievement were also examined. 31 8th grade students were sample of this study. Single group pre-test post-test model was used in order to reveal the information from the data obtained by interest scale and academic achievement test prepared by the researcher. Results indicated that the field trip to a science center caused a permanent increase in students' interest in science and thus improved the academic achievement.

The impact of school trips on learning science subjects were investigated in the recent study of Doğan, Çavuş and Güngören (2011). 34 pre-service teachers were the sample of this research. Activity Evaluation Scale (Cronbach's alpha .78) was used as instrument. Participants attended a field trip to a science museum. Before the trip, students were given some concepts written on colorful cards. They were supposed to find these concepts in the museum during the trip. The findings revealed that nearly all participants stated that the activity was enjoyable and didactic.

Nundy (1999) highlighted variety of learning outcomes of field trips such as gaining higher order thinking enhanced via group work, dialogue, control on learning, thinking and talking about learning. In this research, it was also proposed that cognitive development in students was increased due to the trips, regardless of the subject matter.

In order to understand the importance of socio-cultural base of field trips, it would be a wise decision to focus on the socio-cultural theory in detail.

2.3 Social Constructivism and Socio-cultural Theory

Active learning in education has been gaining importance in contemporary years. Instead of knowledge transformation from one individual (usually teacher) to another (usually student), it has been argued that learning rather an active process that the individual construct his/her own knowledge by her/himself (Bodner, 1986). This concept is called constructivism. In constructivism, it is proposed that students construct their knowledge by themselves and with others among social negotiation (Driscoll, 1994; Keys et al. 1999; Driver and Bell, 1986)

Constructivist theory broadens its boundaries rapidly and different sub-terms emerged, such as "cognitive constructivist theory" or "social constructivist theory". Cognitive constructivists mainly based on how knowledge is constructed in the mind of the learner individually (Posner et al., 1982; Driscoll, 1994; Hewson and Thorley, 1989).

Social constructivism, on the other hand, is a term used to define the importance of society in learning (Derry, 1999). This theory is interacting with with many other theories, mainly Vygotsky and Bruner (Shunk, 2000). Social constructivism is based on some assumptions. Reality is one of these assumptions. It was proposed that reality is constructed through human activity (Kukla, 2000). Knowledge is another assumption of social constructivism. Knowledge is also seemed as a human product, and is socially and culturally constructed (Ernest, 1999; Gredler, 1997; Prawat and Floden, 1994). Learning is also another assumption of this theory which is seemed as a social process. Learning is not and individual process (McMahon, 1997). Learning takes place when students are involved in social tasks (Kim, 2001).

Vygotsky's ideas, which are basically based on the idea that learning occurs in social environments, create a basis for social constructivist theory (Vygotsky, 1978). His view was broaden by different scientists such as Wertsch (1991) who proposed discourse analysis occurs in different parts of society in order to understand the scientific learning. Traditionally in classrooms science concepts were introduced to students in different ways which is accepted that this the only about natural world (Leach and Scott, 2002). However, in everyday life, the spontaneous talking plays a very important role in meaningful learning (Vygotsky, 1987).

2.3.1 Socio-cultural Theory and Science Learning

Socio-cultural understanding in science education implies viewing science, science education, and research on science education as human social activities conducted within institutional and cultural environments (Lemke, 2001). In constructivism, students actively involved in learning. They try to find resources to help them understand concepts.

In the work of Lemke (1983, 1990), classroom interaction in science classes. This research showed that teacher-student interactions is important in learning (Lemke, 1990).

Closely related work which demonstrated the educational importance of social-class dialogues (Hasan, 1995). The role of mathematical symbolism and specialized visual representations, along with classroom learning and in professional scientific practice was also investigated (Roth, 1999; Lemke, 1990).

Roth (Roth, 1999) worked on perspectives and concepts developed by sociologists of science such as Bruno Latour to measure how students learn by

interacting in designing engineering projects, how new ideas spread in the classroom, how students and professionals use graphing as a tool for meaning making, as well as how students use evidence and argument.

The work of Wells (1986) had integrated a discourse-based approach on student learning in inquiry-oriented science curricula from a socio-cultural perspective in the highly multicultural context of urban schools in Toronto.

2.3.2 Socio-cultural Theory and Field Trips

Field trips were also investigated due to their social interaction possibilities. According to socio-cultural theory, learning takes place in social environments (Ash and Wells, 2006). Lev Vygotsky (1987) proposed that mediation provided by objects, symbols and humans was the central idea in socio-cultural theory. The Zone of Proximal Development (ZPD) proposed by Vygotsky is important in understanding learning in field trips where mediation provided by physical objects and people are in consideration. It was proposed that collaborative social interactions help learning and social construction of knowledge (Brown et. al. 1989). This understanding creates an important base for science learning in field trips.

In order to create a collaborative social interaction, students should seek for answer to complex questions via discussions and negotiations (Ash and Wells, 2006). According to socio-cultural theory, the learning happens when student can integrate in a social group (Leinhardt and Knutson, 2004). It was pointed as tremendously important for examining how field trips are established (Tal, 2012). It was proposed that teachers should be extremely cautious in order to push their students forward to interact with other students socially, emotionally and

cognitively. The dialogues between groups were investigated in this study in order to map the interaction level and its impact on students' learning.

According to Rogoff (2003), social interactions have a central role in learning in socio-cultural theory. Family, peer or teacher interactions of students allows them to carry out dialogues (Ash, 2002).

Visitor conversations have been use to show the learning processes in field trips. A different methods such as diaries, interviews and tape recordings of conversations are used. Findings revealed that visitors carry their experiences in the museums to their every-day life (Leinhardt, Tittle and Knutson, 2002).

In the ethnographic case studies of family in which families who were frequent visitors to museums were observed in museums, at home, and in other environments for 18 months (Ellenborgen, 2003), the main focus was families' culture of museum visits. Findings show that family visits to museums enhance family identify.

Audio taping of families' conversations showed that there is a correlation between families' physical and verbal interactions and their learning with the interviews after the visits (Borun et. al., 1998). Findings from this research revealed that families engage in three levels of interaction: indentifying, describing and interpreting and applying.

Although there is a large body of family visit analysis, the investigation of social interaction among students during field trips are new in the area. In the study of Davidson, Passmore and Anderson (2009), a case study that studied the interaction of students, teachers and zoo educators during a class field trip to a zoo revealed that students gave high value and importance on social interactions with their peers.

Another research on school visits to museums, students' learning behaviors during field trips and the interaction between learning in the classroom and in the field trip were investigated (Griffin, 2004). The voice recordings of students revealed that the discussions between students and teachers enhanced learning.

2.4 Importance of Animal Diversity in Education

Biodiversity is the term which is used to define the diversity of the living organisms on earth. As a biological concept, biodiversity often referred as the core unit in K-12 education. Understanding biodiversity is a prerequisite for understanding evolutionary concepts. Evolution and its underlying dimensions such as animal diversity are providing a base for understanding biological concepts such as systems, population genetics, molecular genetics and so on (Dobzhansky, 1973; Silva, Andrade and Caldeira, 2014). In addition, biodiversity connects science and society (Weelie and Wals, 2002). Social awareness about sustainability and environmental conservation is mainly based on the knowledge level of the citizens about science. If citizens are raised with the knowledge and understanding of biodiversity in school institutions, environmental awareness would be established more easily (Barker and Elliott, 2000).

Biodiversity is important because most medical discoveries were made due to biological research on organisms (McGrath and Kimberley, 1999). The understanding biodiversity in science nurtures citizens who are able to manage natural sources, sustain human health, maintain economic stability, and improve the quality of human life (Maglia and Leopold, 2002). School science, in which biodiversity is integrated, should prepare students who understand the nature of

environment and thus prepare environmentally literate citizens (Tsurusaki, Covitt and Anderson, 2009).

Understanding of biodiversity could be established in out-of-school learning environments such as zoos. Zoos sometimes referred as "places of science", in which education and entertainment are integrated (Whitehead, 1995). Zoos could be used as educational centers to help students learn about animal diversity.

Slingsby (2011) argued that biodiversity, as a term, had lost its real meaning. In schools, the main concept of biodiversity is not thought; instead natural history is implemented as a part of K-12 curriculum. However, biodiversity, or biological variation, as he refers, has an important role in understanding Darwinian evolution. In addition, he claimed that biological diversity is the fundamental part of ecological understanding because students can see with their own eyes and wonder about it.

It was claimed that understanding of the diversity of organisms is an important to the ability to read nature (Hellden and Hellden, 2008). The ability to read nature can be seen as a part of ecological literacy. The ecological literacy could be explained as recognition of organisms and as an ability to relate the organisms to energy flow in environment (Magntorn & Helldén, 2007).

Patrick and Tunnicliffe (2013) suggested that zoos should increase their content regarding to raise the issues concerning biodiversity and biological conservation. They proposed that zoos can be used as facilitators of learning and used as institutions for educational field trips.

In the study of Kassas (2002), it was reported that biodiversity education was based on five important baselines: scale of boundaries, perspectives, goals, themes and assimilation. In this study, Kassas addressed the importance of school education

in raising the awareness about the environment, as well as roles of communication and media.

In one of the studies, it was shown that while programmers in school institutions included many of the essential components of knowledge for biodiversity education, there was little attempt to make students understand the biodiversity and to make students ready to deal with complex issues (Gayford, 2000). However, school learning should serve the community and should raise students with understanding of biological diversity and environmental awareness. Thus focusing on making biodiversity more understandable via hands-on activities and first-hand experiences such as zoo visits in school education is essential.

2.5 Summary of the Findings of the Reviewed Literature

Motivation is said to be an important construct for learning Gottfried, 1985; Lepper, Corpus, and Iyengar, 2005). One of the motivational constructs used in this study was continuing motivation. It was explained as the eagerness to come back to working on subjects in a out-of-school environments (Maehr, 1976), or the desire to reengage in the same or similar tasks in the future that are in classroom contexts. The AMS (Valleran et al., 1992) which designed to calculate intrinsic, extrinsic, and amotivation based on the Self-Determination Theory (Deci and Ryan, 1987) was another valuable motivational construct to explain students' motivational levels.

In order to motivate students on both continuing and academic level, field trips would be implemented as a part of instruction. It was suggested that field trips create an environment for interaction between student and real world (Orion, 1993).

Field trips were also social in context and this social nature nurtures the learning via social interaction. Socio-cultural understanding in science education implies viewing science, science education, and research on science education as human social activities conducted within institutional and cultural environments (Lemke, 2001). It was proposed that social interactions help learning (Brown, Collins and Duguid, 1989). In order to create a collaborative social interaction, students should seek for answer to complex questions via discussions and negotiations (Ash and Wells, 2006). According to socio-cultural theory, students learn when they actively involved in social learning groups (Leinhardt and Knutson, 2004).

In the light of the information obtained from the literature review, it can be said that field trip oriented instruction led to motivate students intrinsically and continuingly. Learning science in out-of-school environments can promote meaningful learning. Field trip oriented instruction also promoted social interaction, which enhances learning in multi-dimensional level. Since biodiversity is one of the core concepts in biological science education, and raising environmentally aware citizens is important; the understanding of animal diversity concept in high school education should be taken into consideration carefully. For this reason, the effects of field trip oriented instruction on 9^{th} grade biology students' achievement on animal diversity unit and academic and continuing motivation were investigated in this study.

CHAPTER 3

METHOD

This chapter represents on the methods that were used in the study of motivation to learn biology by the help of a field trip oriented instruction to a zoo. The remainder of this chapter will initially examine the population and sample. Then variables, instruments, procedure, analysis of the data, assumptions of the study and limitations of the study will be examined.

3.1 Population and Sample

The target population of the study is representing all 9th grade private high school students in Ankara district. Since it is almost impossible to reach all 9th grade private high school students in Ankara, accessible population was determined as all 9th grade students in Çankaya district. There were 26 private high schools in Çankaya district and there were 2000 9th grade students who were thought biology. All schools in Çankaya district were sent an informed consent about the study. Only two of them returned and accepted to be a part of the study. One private high school just accepted to be control group and only one private high school's management had allowed to apply a field trip as a part of their 9th grade curriculum. Thus, convenient sampling was done. The sample of this study consisted of 87 ninth grade

students from two private high schools. There were 53 students (30 males and 23 females) in the experimental group and 35 students (21 males and 13 females) in the control group. Students' ages ranged from 15 to 17 years old.

There were an pre-visit lesson and a post-visit lesson before and after the field trip for the experimental group. The pre-visit and post-visit lessons were planned to support the field trip. Control group was thought by traditionally design biology instruction. Before field trip, teachers and the researcher discussed lesson plans before the field trip.

3.2 Variables

There were 10 dependent variables and 3 independent variables in this study.

3.2.1 Dependent Variables

The dependent variables of this study were students' achievement on animal diversity measured by Animal Diversity Achievement Test (ADAT), continuing motivation measured by Continuing Motivation to Learn Biology Survey, academic motivation measured by Academic Motivation Survey. The sub-factors of Academic Motivation Survey are also dependent variables for MANOVA measures. There were seven subscales on the AMS: Amotivation (AMOT), External Regulation (EMER), Introjected Regulation (EMIN), Identified Regulation (EMID), Intrinsic Motivation to Know (IMTK), Intrinsic Motivation to Experience Stimulation (IMES) and Intrinsic Motivation to Accomplish (IMTA).

3.2.2 Independent Variables

The independent variable of this study was type of instruction (field trip and traditional instruction).

3.3 Instruments

Continuing Motivation to Learn Biology Survey (CMTLBS), Academic Motivation Scale (AMS) and Animal Diversity Achievement Test (ADAT) were the instruments of this study.

3.3.1 Continuing Motivation to Learn Biology Survey (CMTLBS)

This instrument was used to measure the continuing motivation level of the students. Continuing Motivation to Learn Biology Survey *(CMLBS)* is originally created by Pascarella, Walberg, Junker, and Haertel (1981). In the study of Pascarella et al. (1981), continuing motivation was measured by a self report questionnaire with 8-items. This questionnaire measured the students' activity on science in out-of-school learning environments. The alpha internal consistency of this study was 0.77 for early adolescents' scores. In this questionnaire students were asked about how often they had done science activities when not required for science classes.

This questionnaire was modified considered to be more current with addition of internet in some activities. The resultant questionnaire was named as Continuing Motivation to Learn Biology Survey. First, the test was translated Turkish from English by the researcher. The translated version was examined by two professors in biology education and one Turkish language teacher to check the language

appropriateness and content validity. The minor modifications in language were done after revision.

Table 1 Modifications on Continuing Motivation Questionnaire developed by Pascarella et. al.

Original	**Modification**	**Rationale**
Read science articles in newspapers.	Read biology related articles in newspapers, magazines or internet.	Introduction of internet is required to make the questionnaire more current. Item – 4 is also combined with this item to reduce redundancy. The term 'science' is changed to 'biology' to be more specific for the rest of the survey.
Work with science related hobbies.	Work with biology related hobbies.	
Gone to hear people give talks on science.	Gone to hear people give talks on biology.	
Read science articles in magazines.	Read science related magazines.	Science related magazines are popular so students can engage with them frequently.
Watch science shows on TV.	Watch biology related documentaries on TV.	The world 'documentary' is used more frequently so students can me more familiar with this word.
Read books about science and scientists.		
Talk about science topics with your friends.	Talk about biology topics with your friends.	
Done science projects.	Done biology projects.	

Second, throughout the survey, the term "science" was changed to "biology", in order to be more specific. The word "Science Show" was changed as "Documentary", since students are more familiar with this term. Finally, "Science Related Articles" was turned into "Science Magazines" also because of the popularity among students.

Survey has 8 questions seeking for the answer to a more general question: "How often have you done the following activities during the last two weeks, when not required for science class?" Note the addition of the words "last two weeks" to both align with the time period of this study and to focus the students on reporting on the activities from the immediate past. The scales were scored as follows: 1 = never, 2 = seldom, 3 = sometimes, 4 = often. The highest possible composite score for the total eight-item CMTLBS is 32 and the lowest is 8 (see Appendix A). This test was administrated by teachers in class hour and took 10 minutes.

Pilot study was done to measure reliability of the test. There were 103 high school students (54 males and 49 females) in the pilot study. A principal component analysis (PCA) was conducted on the 8 items with orthogonal rotation (varimax). The Keiser – Meyer- Olkin measure verified the sampling adequacy for items were the analysis, KMO= .81 ('great' according to Field, 2009), and all KMO values for individual items were > .7, which is well above the acceptable limit of .5 (Field, 2009). Barthlett's test of sphericity χ^2 (21)= 256.09, $p < .001$, indicating that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eingenvalues for each component in the data. Only one component had eigenvalue over Kaiser's criterion of 1. Cronbach alpha reliability of the pilot score of the test was .83, which can be considered as high.

3.3.2 Academic Motivation Scale (AMS)

This instrument was used to determine the motivational level of the students about academic procedures. Academic Motivation Scale (AMS) is an English version of French originated academic motivation survey called as Echelle de Motivation en Education (EME) (Valerand et. al. 1989). The survey was translated to English by the same researchers (Valerand et. al., 1992). The English version has a mean alpha score of .80 which indicates the internal consistency of the scale, and a mean test-retest correlation of .75 over 1 month which indicates temporal stability. The original scale has 7 subscales, including 3 types of Intrinsic Motivation, 3 types of Extrinsic Motivation and one Amotivation. Total 28 7-Likert Type items are included, each subscale has 4 items. 3 subscales under the heading of intrinsic motivation are: To Know ("For the pleasure I experience when I discover new things never seen before."), Toward Accomplishment ("For the pleasure I experience while surpassing myself in my studies"), To Experience Stimulation ("For the pleasure that I experience when I read interesting authors."). 3 subscales of extrinsic motivation are Identified ("Because eventually it will enable me to enter the job market in a field that I like."), Introjected ("To show myself that I am an intelligent person.") and External Regulation ("In order to obtain a more prestigious job later on."). Amotivation has 4 questions seeking for the answers to questions like: " I can't see why I go to college and frankly, I couldn't care less".

The test was scored based on its subscales. There were seven subscales on the AMS: Amotivation (AMOT), External Regulation (EMER), Introjected Regulation (EMIN), Identified Regulation (EMID), Intrinsic Motivation to Know (IMTK), Intrinsic Motivation to Experience Stimulation (IMES) and Intrinsic Motivation to Accomplish (IMTA). The items are rated on a scale, ranging from one

(does not correspond at all) to seven (corresponds exactly). Each subscale consists of four items each; thus subscale scores can range from four to twenty-eight. A high score on a subscale indicates high endorsement of that particular academic motivation (Rickinson et. al., 2004).

The test was translated Turkish from English by the researcher. The translated version was examined by two professors in biology education and one Turkish language teacher to check the language appropriateness and content validity. The minor modifications in language were done after revision.

To check the reliability of the test, a pilot study was done with 103 high school students (54 males and 49 females) in two private high schools in Çankaya district. A principal component analysis (PCA) was conducted on the 28 items with orthogonal rotation (varimax). The Keiser – Meyer- Olkin measure verified the sampling adequacy for items were the analysis, KMO= .85 (‘great’ according to Field, 2009), and all KMO values for individual items were > .74, which is well above the acceptable limit of .5 (Field, 2009). Barthlett’s test of sphericity χ^2 (378)= 4300.27, $p < .001$, indicating that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eingenvalues for each component in the data. Seven components had eigenvalues over Kaiser’s criterion of 1 and in combination explained 92.46% of the variance. Percentage of nonredundant residuals with absolute values > 0.05 is .0%, which is less than the acceptable upper limit of 50% (Field, 2009). The convergence of screen plot and Kaiser’s criterion on seven components, this is the number of components that were retained in the final analysis. Table 3.1 shows the factor loadings after rotation. The items that cluster on the same component suggest that component 1 represents "Extrinsic Motivation – Identified" with the items 13, 14, 15 and 16. Component 2 represents "Extrinsic Motivation – External Regulation" with the items 21, 22, 23, 24. Component 3 represents "Extrinsic Motivation – Introjected" with the items 17, 18, 19 and 20.

Component 4 represents "Intrinsic Motivation – To Know" with the items 1,2,3 and 4. Component 5 represents "Intrinsic Motivation – To Experience Stimulation" with the items 9, 10, 11 and 12. Component 6 represents "Intrinsic Motivation – Toward Accomplishment" with the items 5, 6, 7 and 8. Finally component 7 represents "Amotivation" with the items 25, 26, 27 and 28. This test was administrated by teachers in class hour and took 45 minutes.

The Cronbach Alpha values for each sub scale are all above the acceptable limit of .8. Identified, Experience Stimulation and External Regulation subscales of AMS all Cronbach α= .98. Introjected, Toward Accomplishment and To Know subscales of AMS all Cronbach α= .97. And subscale Amotivation has Cronbach α= .97 (see Appendix C).

Table 2. Summary of explanatory factor analysis results for the Academic Motivation Scale (*N*=103).

	Rotated Factor Loadings						
Item	EMID	EMER	EMIN	IMTK	IMES	IMTA	AMOT
Biyoloji dersi sayesinde ulaşacağım üniversite eğitimi kariyer seçimi konusunda daha iyi bir tercih yapmamı sağlayacağı için biyoloji dersini çalışıyorum.	.948						
Bir kaç yıl daha eğitim görürsem daha iyi bir çalışan olabileceğimi düşündüğüm için biyoloji dersini çalışıyorum.	.936						
Biyoloji dersi sayesinde ulaşacağım üniversite eğitimi seçtiğim kariyere daha iyi hazırlanmamı sağlayacağı için biyoloji dersini çalışıyorum.	.924						
Biyoloji dersi sayesinde ulaşacağım üniversite eğitimi sevdiğim bir sektörde iş bulmamı sağlayacağı için biyoloji dersini çalışıyorum.	.916						
Daha saygın bir iş bulmak istediğim için biyoloji dersini çalışıyorum.		.931					
Daha yüksek bir maaşla çalışabilmek istediğim için biyoloji dersini çalışıyorum.		.93					
İyi bir hayatım olsun istediğim için biyoloji dersini çalışıyorum.		.929					
Lise diplomam olmadan iyi bir iş bulamayacağım için biyoloji dersini çalışıyorum.		.916					
Kendime zeki biri olduğumu göstermek istediğim için biyoloji dersini çalışıyorum.			.924				
Lisede başarılı olursam kendimi önemli hissedeceğim için biyoloji dersini çalışıyorum.			.922				
Lise diploması alabileceğimi kendime kanıtlamak istediğim için biyoloji dersini çalışıyorum.			.914				
Kendime derslerimde başarılı olabileceğimi göstermek istediğim için biyoloji dersini çalışıyorum.			.900				
Yeni şeyler öğrenirken keyif alıyor ve tatmin olduğum için biyoloji dersini çalışıyorum.				.883			

Table 2 (Continued)

İlgimi çeken konular ile ilgili bilgi dağarcığımı genişletirken keyif aldığım için biyoloji dersini çalışıyorum.				.872			
İlgimi çeken konularda yeni bir çok şey öğrenmemi sağladığı için biyoloji dersini çalışıyorum.				.868			
Daha önce görmediğim şeyleri keşfettiğim için biyoloji dersini çalışıyorum.				.851			
Biyoloji ile ilgili ilgimi çeken konular hakkında bir şeyler okurken keyif aldığım için biyoloji dersini çalışıyorum					.882		
Bazı yazarların biyoloji ile ilgili yazdıklarını tamamen anladığımda keyif aldığım için biyoloji dersini çalışıyorum.					.865		
Biyoloji ile ilgili ilginç yazarları okurken keyif aldığım için biyoloji dersini çalışıyorum.					.855		
Biyoloji ile ilgili fikirlerimi başkalarıyla paylaşırken yaşadığım duyguları sevdiğim için biyoloji dersini çalışıyorum.					.851		
Biyoloji dersindeki zor aktivitelerde başarılı olduğumda hissettiğim tatmin duygusunu yaşadığım için biyoloji dersini çalışıyorum						.876	
Kişisel bir başarıya imza attığımı kendime göstermek istediğim için biyoloji dersini çalışıyorum.						.866	
Biyoloji dersinin diğer derslerimde mükemmel olma yolunda yardımcı olduğunu düşündüğüm için biyoloji dersini çalışıyorum.						.845	
Derslerimde ilerlediğimi gördüğümde keyif aldığım için biyoloji dersini çalışıyorum.						.819	
Neden biyoloji gördüğümü bilmiyorum.							.909
Neden biyoloji dersi aldığımı bilmiyorum, bu derslerde ne yaptığımı anlamıyorum.							.907
Bu dersi çalışmak için bir zamanlar iyi sebeplerim vardı ama artık yok.							.865
Dürüst olmak gerekirse neden biyoloji dersi aldığımı bilmiyorum. Biyoloji dersleriyle vaktimi boşa harcadığımı hissediyorum.							.822
Eigenvalues	3.90	3.78	3.75	3.71	3.68	3.55	3.53
% of Variance	13.92	13.49	13.38	13.24	13.14	12.69	12.60
α	.97	.97	.98	.98	.97	.98	.95

3.3.3 Animal Diversity Achievement Test (ADAT)

This instrument was used to assess students' achivement on animal diversity unit in one biology unit on animal diversity. The researcher developed this instrument based on the high school biology curriculum. In question construction process the researcher used textbooks, Higher Education Entrance Examination (YGS) and the literature (Smith et. al., 2003). In test construction process, the objectives of the unit on animal diversity were stated (see Appendix C). This test has 5 True-False questions, 10 Multiple Choice questions and 5 short answer questions, total of 20. Every question was scored as 1= true and 0= false. The highest possible score for total test is 20 and the lowest is 0.

True-false test items were used because these type of items are versatile, accurate and economic, reliable and amenable to item analysis (Ebel and Frisbie, 1991). They are easy to understand because of less verbality, they are useful in testing misconceptions about the concepts. The third question of the ADAT "Majority of the animals are invertebrates" is measuring the main misconception about the animals. Students mainly think majority of the animals are vertebrates, which is one of the main misconceptions about animal diversity (Reece et al., 2010). They can be adopted to wide variety of concepts. And they are suitable to test the concepts with only two reasonable answers. All five of the questions in ADAT were testing the knowledge with two reasonable answers.

Each true-false item has a statement and a blank area. Students supposed to write "true" or "false" in this blank area. The reasons for using multiple choice items was stated by Haladyna (1997): "better content domain sampling, higher reliability, greater efficiency, objectivity, measurability and mechanical scoring" (pp. 65-66).

Each multiple choice test item has five alternatives. The different type of items were used because diversity among test items let the researcher to differentiate different types of learner characteristics (Haladyna, 1997). Items in the test related to binomial nomenclature, hierarchical listing of nomenclature, animal diversity, and features of different animal phyla. The ADAT was examined by two professors and one biology teacher to assess the content validity and by two Turkish language teacher for the the language of items. A pilot test was conducted to evaluate reliability of the test scores. There were 103 high school students (54 males and 49 females) in two private high schools in Çankaya district in the pilot study. The Cronbach alpha was found as .78. The test was given to both control and experimental group prior to treatment as pre-test and after the treatment as post-test. This test was administrated by teachers in class hour and took 30 minutes (see Appendix D).

3.3.4 Semi-Structured Interviews

Further qualitative data were collected with interviews with three students from experimental group. These three students were selected based on maximal variation sampling method (Lincoln and Guba, 1985; Miles and Huberman, 1994; Onwuegbuzie and Leach, 2007). The maximal variation sampling was used to discover individuals who get scores differently on ADAT. One highest (9 points), one lowest (3 points) and one average score (6 points) were used to select these three students. In order to conduct an in-depth analysis of the motivational levels of students in line with their achievement, interview was developed by the researcher. The interview has three parts: (1) Introduction and pre-interview questions, (2) Main questions, (3) Closure. Introduction part includes the brief information about the

research and the interview itself. Then 3 pre-interview questions asked to gather information about overall interest in biology and animal kingdom ("How can you rate your interest in biology, from five to one, five is the highest?"). The main part has 10 open-ended questions focusing on: Behavioral Attitude towards to Continue to Learn Biology ("Which biology subject you are eager to learn outside of classroom?"), Thoughts about Biology ("Do you think biology is fun?"), Effect of Visit ("Did you think about biology after the field trip?"), Situation ("What kind of situations make you to learn biology?"), Cost ("How much time you need to spend in order to be a proficient achivement on animal diversity unit?"), Value ("How achivement on animal diversity unit help you in your life?"), Knowledge Level and Interest Relationship ("Can you say that your achivement on animal diversity unit level effects your interest in biology?") and Social Influences ("How your environment effect your interest in biology?") (see Appendix L).

3.3.5 Dialogic Inquiry

The Dialogic Inquiry Method (Ash, 2003) was used to code the dialogues between group members during the field trip. Ash (2003) proposed a coding protocol for the dialogues occur between group members during the visit. In this protocol, the entire dialogue separated into more meaningful units called representative dialogic segments (RDSs), which are an example of a larger conversation. The criteria for the selection of representative intermediate-size segments are listed as: “(a) presence of thematic content and differential knowledge of these themes by family members, (b) use of inquiry skill and differential knowledge of these skills by family members, and (c) sustained dialogue in which members of the family attempt to make sense of the themes using inquiry skills” (Ash, 2003, p.144).

In this study, six RDSs were selected among the whole conversation occurred in-between the all seven groups. All RDSs and their analysis were presented in Results Chapter.

3.4 Procedure

In this sequential explanatory mixed method study, both quantitative and qualitative methodologies were used. The study started with a review of literature. Next, the instruments were developed based on research questions. One instrument was developed by researcher and two instruments were taken from literature and modified to the current study. The instruments were examined in pilot study. Results of the pilot study were examined by researchers and biology teachers with respect to reliability and validity issues. Necessary changes were done. One control group and one experimental group were formed for the research design.

This study was carried out over a four-week period. A sequential explanatory mixed method study was used because qualitative data were collected after quantitative data were obtained. The groups could not be selected randomly due to administrative issues. Two private high schools in Çankaya. The procedure of the study was summarized in Table 3.

Table 3 Research design of the study

Groups	Pre-test	Treatment	Post-Test	Interviews	Dialogic Inquiry
Experimental	ADAT, AMS, CMTLBS	Pre-visit activity, Field trip, Post visit activity	ADAT, AMS, CMTLBS	Three students interviewed	Dialogues among students in field trip were analyzed.
Control	ADAT, AMS, CMTLBS	Traditional Classroom Instruction	ADAT, AMS, CMTLBS	None	None

According to Ministry of National Education, for the diversity of living organisms unit 28 lesson hours were given. Since there were 6 sub-categories (bacteria, archeabacteria, protista, fungi, plants and animals), each kingdom receives approximately 6 lessons (45-minute for each). Each week students participate to 2 biology lessons. For animal diversity unit, 4 weeks with 8 lessons were used in this research. In one private high school, two different classrooms with the same biology teacher was used as control group (one classroom with 19 students, the other classroom with 16 students total 35 students). In another private high school three different classrooms, two of them with same biology teacher and one of them with different biology teacher were used as experimental groups (in one classroom 16 students, in another classroom 19 and the final classroom 18 total 53 students).

In this study, the three biology teachers and the researcher had 3 meetings before the treatment. In the first meeting the general information about the research were given. In the second meeting the field trip procedure were discussed in detail.

In the last meeting, the lesson plans for traditional classroom and experimental group classroom were discussed.

Both groups receive pre-test quantitative instruments. AMS, ADAT and CMTLBS were given for both groups by teachers. The administration of the tests took 85 minutes in total. Two lessons were used for the administration process.

The treatment of control group was regular classroom instruction on Animal Diversity. In the first week, teacher presented some photographs of different organisms and made the students guess which were of them were animals. This activity created an interest on students about different kinds of animals. Some species look like bacteria and some look like plants. This resemblance made the students surprised about the animal kingdom. Discussion about animals given in the photographs and their habitats took place in the lesson. The fallowing two weeks, teacher explained the animal species from sponges to Chordata with examples. For all animal species, she gave photographs and explained their body functions and characteristics. The last week was given to an activity about animals. In this activity, students were given different animal photographs and they were asked to find which phylum they were in. After this activity, a discussion about the answers of students were done.

The experimental group received a preparation lesson before the visit. In this lesson, teacher gave the pre-visit worksheet to the students. In this worksheet, the list of animal phyla to be seen in the field trip were written (mammals, reptiles, birds, amphibians and fishes). For each phyla, the nomenclature, the special features and examples of this phyla were asked. Students supposed to separated into five groups and each group worked on one of the five phyla. At the end of the lesson each group presented their findings to other groups and every student fill the worksheet appropriately (see Appendix E for the lesson plan). The example of one

answer for Mammals was like this: "Animalia/ Chordata/ Vertebrata/ Mammalia. They have 4-chambered heart. They are warm-blooded animals. Their skin is covered by hair. Mothers give birth to infant and feed them with their own milk." The students' version of the pre-visit activity worksheet was presented in Appendix F. The teacher's answer key version of pre-visit activity worksheet was presented in Appendix G.

Main treatment of experimental group was the two half-day visits (three hours) for a zoo. Before the visits all students were gathered in front of the zoo's entrance. 53 students were divided into 8 groups. Each group has 6 students and one group has 7 students. Each group also has a group leader (researcher, biology teachers or research assistants). Group leader has a recording device in order to record the dialogues among students. Each student was given animal classification grid. This grid would be filled in the field trip (see Appendix H). The grip consists of 5 phyla. Mammals had 6 grids, which means students supposed to find 6 different mammals and write down their Latin name and common features in the corresponding grids. As an example: "Elephant. Animalia/ Chordata/ Vertebrata/ Mammalia. This species is African Elephant which has smaller ears and larger head. They live in South Asia. They are herbivores." Fishes had 5 grids. Reptilian had 4 grids, birds had 4 grids and amphibians had 3 grids to be filled. Students were also given a map of the zoo (see Appendix K). Each group was free to choose the visit path as long as the filled all the blank areas in the grid. The group leaders had one-hour pre-visit meeting. In this meeting researcher gave the information about the visit. Researcher explained the animal classification grid, the map of the zoo, and how to record the conversations among students during the visit. The leaders were told that they can help students to find their ways in the zoo but the students should decide which path to fallow. The students of each group should stay together during the visit in order to capture all the conversation between students. The duty to keep

all the students together was the group leader's. The following week, students participated another visit to the zoo in order to finish the activity.

In the next week, 2-hour post-visit-activity were done in the classroom (see Appendix I for the lesson plan). In this lesson, students shared the information they

gathered in the zoo. They discussed the findings. Teacher asked questions about animal diversity and their visit.

Both groups then received a post-test quantitative instruments. Three students from the experimental group were selected for the post-visit interviews. These students were selected due to their scores in post-ADAT. One student who had the highest scores in ADAT, one student who had the average scores in ADAT and one students who had the lowest scores in ADAT were selected. The interviews were conducted in biology laboratory one-by-one with the researcher. Each interview were took 5 minutes.

3.5 Analysis of Data

In this study, both quantitative and qualitative data were collected and analyzed.

3.5.1 Quantitative Data Analysis

Quantitative data were collected via Academic Motivation Scale (AMS), Continuing Motivation to Learn Biology Survey (CMTLBS) and Animal Diversity Achievement Test (ADAT). Data set were entered to the PASW (Predictive Analysis Software) Statistics 18 data sheet, as variables were represented in columns

and participants were represented in rows. Columns included name, gender, group, answers of each participant to each question and participants' total scores for each test.

Missing data analysis were conducted before further analysis. As the tests were administrated at the same time, there were no missing values in all pre-tests. There were missing data in post-AMS, post-CMTLBS, and post-ADAT. The percentages of missing values were %2.5 of the total number of post-AMS, post-CMTLBS, and post-ADAT. Missing values were replaced with the mean during the statistical analysis.

The quantitative data were analyzed in two parts. The first part included descriptive statistics and the second part included inferential statistics. Inferential statistical analysis was also divided into three different types. The first analysis were done to compare pre-test results of both control and experimental groups. In this analysis, Univariate ANOVA were conducted. In a Univariate ANOVA there is one dependent variable (the pre-test results of ADAT and CMTLBS) (Field, 2007). Since the means of pre-test of each test were compared, Univarite ANOVA was a suitable statistical analysis for this study. For the comparison of AMS scores, One Way MANOVA was done with its factors. In this analysis, seven factors were dependent variables and group was independent variable. Since there were more than two dependent variables, MANOVA was suitable for the test. The second analysis was done to compare post-test results of both control and experimental groups. In this analysis, univariate ANOVA were conducted for post-test results of ADAT and CMTLBS using group as independent variable (experimental group versus control group). Since there are more than one dependent variable, MANOVA was suitable for this analysis. However, one of the assumptions of MANOVA was the dependent variables should correlate moderately with each other. On the contrary, the two dependent variables were not correlated at all. According to Field (2007), it was proposed that if two dependent variables correlate with each other,

Univariate ANOVA could be conducted for two dependent variables separately. Thus, Univariate ANOVA was conducted instead. The third analysis was done to compare the means of post-test sub-scales based on the group of Academic Motivation Scale. Multivariate Analysis of Variance (MANOVA) were conducted. Since the Academic Motivation Scale has different sub-scales; to analyze the effect of field trip on these sub-scales (more than one dependent variables), it was needed to have a statistical analysis in which the more than one dependent variables were included. MANOVA was used because of this reason. All statistical analysis were done by PASW Statistics 18. The level of significance (α) was.05 because this value is used frequently in educational studies. The power of this study was set to .80. Effect size was set as medium as used in other educational studies.

3.5.2 Qualitative Data Analysis

The qualitative data were collected in two different ways. First, the dialogues of the group members in the field trip were recorded for Dialogic Inquiry Method. Second, semi-structured interviews were used to collect qualitative data.

The Dialogic Inquiry Method (Ash, 2003) was used to code the dialogues between group members during the field trip. Ash (2003) proposed a coding protocol for the dialogues occur between group members during the visit. In this protocol, the entire dialogue separated into more meaningful units called representative dialogic segments (RDSs), which are an example of a larger conversation.

In the interviews, a tape recorder was used. A coding grid was developed and answers of three students were entered to the coding grid under the heading of dimensions (see Appendix M). Then three different researchers were analyzed data. Every answer was categorized according to the question. For example, the answers

to the question “Are you interested in any biology concept other than school lessons?” were categorized as (1) no interest, (2) mild interest and (3) highly interested. All coded transcripts by three different researchers were compared. Every researcher code the interview answers same except one question. For Value question, one of the researchers code first student's answer as only "health related issues", but two other researchers code this answer for both "health related issues" and "social and cultural". As final code, the researcher took both of them as an answer. The coded answers were analyzed one by one by the researcher and the results reported in the Results Chapter.

3.6 Assumptions of Study

1. Students in the experimental group were not interacting with the students in the control group.
2. The tests were administrated under standard conditions.
3. The students answered the items of the tests honestly and seriously.
4. The teacher was not biased during the treatment.

3.7 Limitations of the Study

1. The study was limited to the unit of animal diversity.
2. This study was conducted with 87 students which is a small part of the accessible population.
3. Independent observations assumption could not be met because tests were administrated to groups at the same time.
4. The generalizability of this study was limited because convenience sampling was done

CHAPTER 4

RESULTS

The results have four parts. In the first part, statistical analysis of the pre-test scores on ADAT, CMTLBS and AMS were analyzed; in the second part statistical analysis of post-test scores on ADAT, CMTLBS and AMS were explained; in the third part students' responses to the interview questions were analyzed; and in the last part, dialogues among students during field trip were analyzed.

4.1 Statistical Analysis of Pre-test Scores

Pre-ADAT and Pre-CMTLBS scores of control and experimental groups were compared using univariate ANOVA. Pre-AMS scores of control and experimental groups were compared MANOVA, in which the factors of AMS were compared.

4.1.1 Statistical Analysis of Pre-ADAT and Pre-CMTLBS Scores

Pre-ADAT and pre-CMTLBS scores of control and experimental groups were compared prior to the hypotheses testing in order to control the group differences. Pre-tests were compared using univarite ANOVA because there was one dependent variable for each test (Field, 2009). The mean differences of pre-tests between experimental and control groups were tested individually.

Descriptive statistics for the dependent variable across experimental and control groups were shown in the Table 4.1 In this table CG refers to control group, EG refers to experimental group.

Table 3. Descriptive Statistics with respect to pre-ADAT and pre-CMTLBS scores across experimental (N=53) and control groups (N=34).

	Mean		SD		Skewness		Kurtosis	
	Pre-ADAT	Pre-CMTLBS	Pre-ADAT	Pre-CMTLBS	Pre-ADAT	Pre-CMTLBS	Pre-ADAT	Pre-CMTLBS
CG	9.82	16.44	2.27	5.01	-.03	.65	-.94	.34
EG	9.81	16.02	3.18	4.81	.62	.30	.18	-.13

Univariate normality, independence of observations, and equality of variances assumptions were checked prior to interpretation of the univariate ANOVA results. Despite the interaction between students during the treatment, it was assumed that they took the tests separately without any interaction. Skewness and kurtosis values for individual dependent variables were checked for normality. In the Table 4, since all values were between -2 and +2 (Field, 2009), it can be

concluded that the dependent variables are normally distributed. Equality of variances assumption was testes with Levene's test.

Table 4 Levene's test of equality of error variances for pre-ADAT and pre-CMTLBS.

	F	df1	df2	Sig. (p)
Pre-ADAT	2.052	1	85	.156
Pre-CMTLBS	.002	1	85	.966

As the Table 5 indicates, normality assumption was met. Having met the assumptions of univarite ANOVAs, the results were analyzed.

Table 5 Two separate univariate ANOVA results with respect to pre-ADAT and pre-CMTLBS scores

	F	df1	df2	Sig. (p)
Pre-ADAT	.000	1	85	.985
Pre-CMTLBS	.15	1	85	.70

As the indicated in the Table 4.3, there were no significant mean difference in students' results to pre-ADAT and pre-CMTLBS prior to treatment between experimental and control groups.

4.1.2 Statistical Analysis of Pre-AMS Scores Based on its Factors

As explained early, Academic Motivation Survey had seven factors: Amotivation (AMOT), To Know (IMTK), Toward Accomplishment (IMTA), Experience Stimulation (IMES), Identified (EMID), Introjected (EMIN) and External Regulation (EMER).

Each factor was taken as dependent variable and group (Experimental and control) was taken as independent variables to compare the pre-test scores of two different groups. One-way multivariate analysis was conducted. Table 6 includes descriptive statistics regarding pre-AMOT, pre-IMTK, pre-IMTA, pre-IMES, pre-EMID, pre-EMIN and pre-EMER for groups.

Table 6 Descriptive statistics of pre-AMOT, pre-IMTK, pre-IMTA, pre-IMES, pre-EMID, pre-EMIN and pre-EMER scores across experimental (N=53) and control groups (N=34).

	N		Mean		Std. Dev		Skewness		Kurtosis	
	CG	EG	CG	EG	CG	EG	CG	EG	CG	EG
Pre-AMOT	34	53	8.47	8.96	4.29	5.72	.1.35	1.45	1.56	1.69
Pre-IMTK	34	53	16.12	16.49	3.44	6.63	-.27	-.72	-1.55	.22
Pre-IMTA	34	53	14.85	15.33	4.53	6.62	-.92	-.50	.44	-.54
Pre-IMES	34	53	12.85	12.83	4.50	5.89	-.28	.02	-.69	-.64
Pre-EMID	34	53	11.56	11.58	4.63	6.44	.14	-.01	-.64	-.80
Pre-EMIN	34	53	15.14	14.88	3.91	4.83	-.46	-.81	.29	.24
Pre-EMER	34	53	16.47	16.57	4.15	5.70	-1.23	-.70	.63	.19

Table 6 indicates that the experimental group had higher mean scores of each motivational factors. The skewness and kurtosis values were in the range of -2 and +2 which supports the normal distribution assumption. In order to see whether these mean differences were statistically significant, MANOVA was conducted.

Before the results of MANOVA was reported, sample size, normality and outliers, linearity, multicollinearity and singularity, and homogeneity of variance/covariance matrices assumptions were checked.

Sample Size assumption was checked due to Pallant's (2007) proposition as the number of the cases should be more than the dependent variables for each cell,

thus the sample size of the study was large enough to met the sample size assumption of MANOVA.

For the control of normality and outliers assumptions, the values of skewness and kurtosis were presented in Table 4.4. The skewness and kurtosis values were in the range of -2 and +2 for both experimental and control groups. Thus the normality assumption for MANOVA was met. Multivariate outliers assumption was checked using Mahalanobilis value from Mahalanobilis distance output. Tabachnick and Fidell explains Mahalanobilis distance as "the distance of a particular case from centroid of the remaining cases" (196, p. 67). The value of maximum distance for the study was found 2.17. According to Field (2009), the data's Mahalanobis distance value is compared against the critical value outlined in chi-square critical value chart. For 7 dependent variables and samples size of 80, the critical value is 3.58. Since the value is below 3.58, it means the study was not violated the multivariate outliers assumption.

Multicollinearity and singularity was also checked. MANOVA function best if dependent variables are correlated moderately (Pallant, 2007). Correlations between all five dependent variables are checked. Table 7 includes the correlations among the dependent variables, the assumption was met.

Table 7 Correlations between dependent variables of pre-AMS

	AMOT	IMTK	IMTA	IMES	EMID	EMIN	EMER
AMOT	---						
IMTK	-.150	---					
IMTA	-.406**	.605**	---				
IMES	-.480**	.533**	.700**	---			
EMID	-.490**	.275*	.341**	.655**	---		
EMIN	-.010	.374**	.214*	.175	.308**	---	
EMER	-.026	.287**	.101	.151	.121	.516**	---

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

The linearity assumption controls the existence of straight-line relationship among the dependent variables (Pallant, 2007). The scatter-plots were examined and all seven dependent variables satisfy the linearity assumption.

Equality of variances assumes that the population distributions have the same variances (Pallant, 2007). The homogeneity of variance/covariance assumption of MANOVA was controlled through Box's M Test of Equality of Covariance Matrices and the Levene's Test of Equality of Error Variances. As indicated in the Table 8, the covariance matrices of the dependent variables were equal F(28, 17378.72) = 2.362, p=.003. Due to Tabachnick and Fidell (1996), with significant value larger than.001, the assumption was met.

Table 8 Box's Test of Equality of Covariance Matrixes of pre-AMS

Box's Test of Equality of Covariance Matrices	
Box's M	73.02
F	2.362
Df1	28
Df2	17378.715
Sig.	.003

Homogeneity of variance was controlled by from Levene's test, the results are given in Table 9. Each dependent variable of motivation except for pre-AMOT and pre-IMES has equal variances for experimental and control groups. Thus the assumption is not violated.

Table 9 Levene's Test of Equality of Error Variances of Pre-AMS

	F	df1	df2	Sig.
preAMOT	8,014	1	85	,006
preIMTK	3,896	1	85	,052
preIMTA	3,342	1	85	,071
preIMES	4,512	1	85	,037
preEMID	2,035	1	85	,157
preEMIN	2,860	1	85	,094
preEMER	3,098	1	85	,082

After verifying the assumptions of MANOVA, the analysis had been conducted to examine mean differences.

A one-way multivariate analysis of variance (MANOVA) was conducted to investigate the effect of field trip on 7 different motivational factors.

Table 10 MANOVA results based on the Factors of pre-AMS

Source	Wilk's Lambda	F	Sig. (p)
Group	.743	3.90	.669

As indicated in the Table 4.8, there was no significant mean difference of academic motivational dependent variables AMOT, IMTK, IMTA, IMTS, EMID, EMIN, EMER, $F(7,79)= 3.90$, $p>.05$, in terms of group. It means the students in experimental and control groups had no significant difference with respect to sub-categories of pre-test of Academic Motivation survey.

4.2 Statistical Analysis of Post-Test Results

4.2.1 Statistical Analysis of Post-CMTLBS and Post-ADAT Results

Post-CMTLBS and Post-ADAT scores were taken as dependent variables individually and group (Experimental and control) was taken as independent variable to test the null hypothesis 1 and 2. After the treatment, fist MANOVA was

performed. However, the correlations between dependent variables were too low to meet the assumption of MANOVA in which moderate correlation between dependent variables were asked. Thus, as proposed by Field (2009) one-way univariate analysis for both dependent variables independently was conducted to test the hypothesis instead of MANOVA. Table 11 includes descriptive statistics regarding Post-ADAT and Post-CMTLBS.

Table 11 Descriptive Statistics for Dependent Variables across Experimental and Control Groups

	Mean		SD		Skewness		Kurtosis	
	Post-ADAT	Post-CMTLBS	Post-ADAT	Post-CMTLBS	Post-ADAT	Post-CMTLBS	Post-ADAT	Post-CMTLBS
CG	11.21	17.50	2.74	4.74	-.09	.50	.37	-.18
EG	12.83	21.09	3.44	3.52	.50	-.65	.90	1.41

Independence of observations, univariate normality and equality of variances assumptions were checked prior to interpretation of the univariate ANOVA results. Skewness and kurtosis values were checked for normality assumption. In the Table 11, since all values were between -2 and +2 (Field, 2009), it can be summed up that the dependent variables are normally distributed.

As the Table 12 indicates, non-significant result of post-ADAT by proposing that normality assumption was met and population variances of the dependent variables were same across the groups. However, for post-CMTLBS, the Levene's test results were significant, hence assumption of homogeneity of variance has been violated.

As proposed by Field (2009), if Levene's test is significant, Hartley's Fmax test could also be another way to test homogeneity of variances. In order to do that, the square of standard deviation of the groups were calculated to reach the variance values. For post-CMTLBS, the largest value of square of standard deviation was 22.47, and the smallest was 17.77. The ratio was 1.26. The critical value for this group with n-1= 52 and 2 variances was 2.5. Since the value was smaller than the

critical value, the homogeneity of variances for post-CMTLBS was not violated (Field, 2009).

Table 12 Levene's test of equality of error variances of Post-ADAT and Post-CMTLBS Scores

	F	df1	df2	Sig. (p)
Post-ADAT	.947	1	85	.333
Post-CMTLBS	4.669	1	85	,034

As the Table 11 indicates, normality assumption was met. Now, analysis could be done.

Table 13 Two separate univariate ANOVA results with respect to post-ADAT and post-CMTLBS scores

	F	df1	df2	Sig. (p)
Post-ADAT	.5.37	1	85	.023
Post-CMTLBS	.16.31	1	85	.000

As the indicated in the Table 13, there were significant mean difference in students' results to post-ADAT and post-CMTLBS in favor of experimental group. Thus we reject the null hypotheses of 1 and 2 since there were a significant mean difference between control and experimental groups with respect to students' achievement on animal diversity unit and continuing motivation to learn biology.

4.2.2 Statistical Analysis of Post-AMS Scores Based on its Factors

As explained early, Academic Motivation Survey had seven factors: Amotivation (AMOT), To Know (IMTK) , Toward Accomplishment (IMTA), Experience Stimulation (IMES) , Identified (EMID), Introjected (EMIN) and External Regulation (EMER).

Each factor was taken as dependent variable and group (Experimental and control) was taken as independent variables to test the null hypotheses 3, 4, 5, 6, 7, 8 and 9. After the treatment, one-way multivariate analysis was conducted to test the hypothesis. Table 4.14 includes descriptive statistics regarding AMOT, IMTK, IMTA, IMES, EMID, EMIN and EMER.

Table 14 Descriptive statistics of post- AMOT, IMTK, IMTA, IMES, EMID, EMIN and EMER for groups

	N		Mean		Std. Dev		Skewness		Kurtosis	
	CG	EG	CG	EG	CG	EG	CG	EG	CG	EG
AMOT	34	53	8.47	8.79	4.29	5.63	1,352	1,581	1,561	2,166
IMTK	34	53	17.12	21.11	3.72	5.08	,070	-,480	-1,197	-,176
IMTA	34	53	15.44	18.87	3.82	5.21	-,689	-,412	-,213	,277
IMES	34	53	12.79	15.85	4.76	6.73	-,104	-,186	-1,018	-,967
EMID	34	53	10.94	14.13	5.18	7.34	,443	,124	-,741	-1,143
EMIN	34	53	16.44	20.23	5.05	6.16	-,407	-,913	,147	,377
EMER	34	53	16.47	16.45	4.15	5.92	-1,229	-,719	,625	,055

Table 14 indicates that the experimental group had higher mean scores of each motivational factors. The skewness and kurtosis values were in the range of -2 and +2 which supports the normal distribution assumption. In order to see whether these mean differences were statistically significant, MANOVA was conducted.

Before the results of MANOVA was reported, sample size, normality and outliers, linearity, multicollinearity and singularity, and homogeneity of variance/covariance matrices assumptions were checked.

Sample Size assumption was checked due to Pallant's (2007) proposition. It was said that the sample size should be more than the dependent variables, thus the sample size of the study was large enough to met the sample size assumption of MANOVA.

To check the normality and outliers assumptions, the values of skewness and kurtosis examined for all dependent variables. As shown in the table 4.14, the skewness and kurtosis values were in the range of -2 and +2 for both experimental and control groups. Thus the normality assumption for MANOVA was met.

Multivariate outliers assumption was checked using Mahalanobilis value from Mahalanobilis distance output. Tabachnick and Fidell explains Mahalanobilis distance as "the distance of a particular case from centroid of the remaining cases" (196, p. 67). The value of maximum distance for the study was found 5.89. According to Field (2009), the data's Mahalanobis distance value is compared against the critical value outlined in chi-square critical value chart. For 5 dependent variables, the critical value is 11.07. Since the value is below 11, it means the study was not violated the multivariate outliers assumption.

Multicollinearity and singularity was also checked. This assumption related with the correlations between dependent variables. MANOVA function best if dependent variables are correlated moderately (Pallant, 2007). Correlations between all five dependent variables are checked. Table 15 includes the correlations among the dependent variables, the assumption was met.

Table 15 Correlations between dependent variables of AMS

	AMOT	IMTK	IMTA	IMES	EMID	EMIN	EMER
AMOT	---						
IMTK	-.197	---					
IMTA	-.287**	.644**	---				
IMES	-.472**	.480**	.510**	---			
EMID	-.431**	.251*	.257*	.489**	---		
EMIN	.096	.416**	.230*	.007	-.034	---	
EMER	-.028	.376**	.226*	.130	.083	.500**	---

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

The linearity assumption was met due to scatter plots. Equality of variances assumes that the population distributions have the same variances (Pallant, 2007). The homogeneity of variance/covariance assumption of MANOVA was controlled through Box's M Test of Equality of Covariance Matrices and the Levene's Test of Equality of Error Variances. As indicated in the Table 16, the covariance matrices of the dependent variables were equal F(28, 17378.72) = 1, 768, p=.007. Since significant value is larger than .001, then the assumption was not violated.

Table 16 Box's Test of Equality of Covariance Matrixes of Post-AMS scores

Box's Test of Equality of Covariance Matrices	
Box's M	54.658
F	1.768
Df1	28
Df2	17378.715
Sig.	.007

Homogeneity of variance was checked from Levene's test table, the results are shown in table 17. Each dependent variable of motivation except for EMID has equal variances for experimental and control groups. Having normal skewness and kurtosis values along with not large F value implies that the assumption is not violated.

Table 17 Levene's Test of Equality of Error Variances of Post-AMS Factors

	F	df1	df2	Sig.
postAMOT	2,192	1	85	,142
posIMTK	1,824	1	85	,180
postIMTA	2,073	1	85	,154
postIMES	4,621	1	85	,034
postEMID	8,665	1	85	,004
postEMIN	1,200	1	85	,276
postEMER	3,382	1	85	,069

After verifying the assumptions of MANOVA, the analysis had been conducted to examine mean differences.

A one-way multivariate analysis of variance (MANOVA) was conducted to investigate the effect of field trip on 7 different motivational factors.

Table 18 MANOVA results based on the Factors of AMS

Source	Wilk's Lambda	F	Sig. (p)
Group	.724	4.301	.000

There was a significant effect of treatment on academic motivational dependent variables AMOT, IMTK, IMTA, IMES, EMID, EMIN, EMER, $F(7,79)= 4.30$, $p<.05$. It means the students in experimental and control groups had significant difference with respect to sub-categories of Academic Motivation survey.

To reveal which dependent variable of motivation had significant difference between-subjects effects was performed. Table 4.19 shows the details about each dependent variable.

Table 19 Between-subjects Effects of Post-AMS Factors

	Dependent Variable	Df1	F	Sig. (p)	Eta Squared	Power
Group	postAMOT	1	.081	.777	.001	.059
	posIMTK	1	15.642	.000	.155	.974
	postIMTA	1	10.913	.001	.114	.904
	postIMES	1	5.296	.024	.059	.624
	postEMID	1	4.863	.030	.054	.587
	postEMIN	1	8.953	.004	.095	.841
	postEMER	1	11.455	.654	.119	.917

When control and experimental group regarding the seven motivational factors had examined at significance level, only Amotivation had no statistically significant mean difference between the groups (F (1.2.14)=.08, p>.05). It was same with post-EMER results. For External Regulation, control group's mean was 16.47 and experimental group's mean was 16.54. All other motivational factors has statistically significant mean differences between control and experimental groups. For To Know, the mean was 17.11 for control group, whereas the mean was 21.11 for experimental group. For Toward Accomplishment, control group's mean was 15.44 but for experimental group it was 18.87. For To Experience Stimulation, the mean of control group 12. 79 but for experimental group it was 15.85. For Identified, the control group's mean was 10.94 however the mean for experimental group it was 14.13. For Introjected, the control group's mean 16.47 but the experimental group's mean was 20.22.

The Null Hypothesis 3 which was stating no significant mean difference between the groups exposed to field trip oriented instruction and traditionally

design biology instruction with respect to students' intrinsic motivation: to know (IMTK), The Null Hypothesis 4 which was stating there is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' intrinsic motivation: toward accomplishment (IMTA), The Null Hypothesis 5 which was stating there is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' intrinsic motivation: to experience stimulation (IMES), The Null Hypothesis 6 which was stating there is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' extrinsic motivation: identified (EMID), The Null Hypothesis 7 which was stating there is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' extrinsic motivation: introjected (EMIN), The Null Hypothesis 8 which was stating there is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' extrinsic motivation: external regulation (EMER) and The Null Hypothesis 9 which was stating there is no significant mean difference between the groups exposed to field trip oriented instruction and traditionally design biology instruction with respect to students' amotivation (AMOT). We reject the null hypotheses 3, 4, 5, 6, 7 and 8 because there was a statistically significant mean difference between experimental and control groups with respect to IMTK, IMES, IMTA, EMER, EMID, EMIN. However, we cannot reject the null hypothesis 9 because there was not a statistically significant mean difference between experimental and control groups with respect to AMOT.

4.3 Analysis of Students' Responses to Interview Questions

Interviews with 3 students were done from experimental group. In order to obtain in-depth information about students' opinions about field trip, interviews were done. One student with highest post-ADAT score, one student with average post-ADAT score and one student with lowest post-ADAT score were chosen for interviews. Interview results indicated that students' motivation on biology positively affected by the field trip regardless of their achievement levels. Students' responses to the interviews questions were coded and then these codes were categorized into 13 themes: Students' Characteristics, Interest in biology, Biological Activity Outside of the Classroom, Future Plans, Behavioral Attitude towards to Continue to Learn Biology, Thoughts about Biology, Effect of Visit, Situation, Cost, Value, Knowledge Level and Interest Relationship and Social Influences.

4.3.1 Characteristics of the Interviewed Students

3 students were interviewed 1 week after the school trip. The first student (Kamil) got the highest score (9 points) in Animal Diversity Achievement Test. His biology grades are also the highest among his classmates (his biology grade in first semester was 5). He is 15 years old. His father is an attorney and his mother is teacher.

The second student (Buğra) is also 15 years old. His ADAT score was average (6 points), same with his school grades (his biology grade in the first semester was 4). His sister is a doctor, father is an engineer and mother is a housewife.

The last student (Kerem) got the lowest score (3 points) in ADAT (his

biology grade in the first semester was 3). His teacher said that he is a very shy student. First he hesitated to attend the interview but after the introduction he felt more comfortable. He is also 15 years old. His mother is doctor and his father is an engineer.

4.3.2 Interest in Biology

Students' attitude towards biology were questioned via "If you rate your interest in biology from 5 to 1, 5 is the highest, what number would you give?". The answers show similar pattern with their achievement. Kamil reported his attitude as high as 5, Buğra gave 3 over 5 and Kerem assigned 2 over 5.

4.3.3 Biological Activity Outside of the Classroom

In this theme, three questions were asked to the students. The first question was "Do you visit zoos, museums or science centers? If you do, with whom, how frequently and when?". All three students visit zoos as frequently as two to three times in a year. Kamil visited al little bit more than other two students. He reported the visit frequency as "whenever I found time". Kamil visited zoos with relatives and Buğra and Kerem visited zoos with relatives and friends. Kamil and Buğra reported that the reason for their visit is generally to have fun. Kerem visited zoos in order to learn something.

The second question of this theme was "Do you watch documentaries? Which channels you prefer? Can you remember any information from any documentary lately?" Kamil said that before he watched almost every day but he cannot watch for two weeks because of the exam schedule. That is why he cannot remember any information. He prefers National Geographic and Discovery Channel.

Buğra was also reported that he watches frequently but he prefers history programmers. Discovery Channel and National Geographic were also his favorite channels. Kerem said he was interested in animals such as dolphins, cheetahs and tigers. His favorite channels were National Geographic, Animal Planet and Discovery Channel.

This themes third question was about science websites. According to the question, " Do you frequently fallow a science web site?", Kamil answers that question as "I do not fallow a specific website but when I come across with an article about biology I read it carefully". Buğra said "I sometimes check Hürriyet Technology Website." Kerem said "I fallow science news from facebook".

The last question of this theme was about reading science magazines. All three students answer that question as, "Our classroom subscribed to Bilim ve Teknik magazine. Every month we read it in the classroom".

..

4.3.4 Future Plans

This theme's only question was about the future plans of the students. Only Kamil said he wants to be microbiologist. Buğra said he wants to be pilot and Kerem said he prefers to be a mechanical engineer. The future plans were also reflecting the achievement levels of the students.

4.3.5 Behavioral Attitude towards to Continue to Learn Biology

For the question "what biology subject do you interested in when it is not required by the school?", Kamil reported that bacteria and health related issues were the subjects he was interested in. Buğra said he was not interested in biology at all

and Kerem said animals without hesitation. Although Kerem reported he was not interested in biology, this answer said otherwise.

4.3.6 Thoughts about Biology

For this theme, the question was "is biology fun?". Kamil said "Definitely. Because my teacher is perfect." Buğra answered in a different manner: “Some subjects are fun, such as systems. Systems are fun because they have a story. However other subject need a lot of memorization and I do not like it.” An interesting answer was given by Kerem: “If no grades were given, I think Biology would be more interesting”. Grade anxiety of Kerem was blocking his interest in biology.

4.3.7 Effect of Visit

This theme has seven questions. All questions were analyzed one by one.

"What is your level of interest in biology before field trip?"

Kamil: It was not that much.

Buğra: I was not interested.

Kerem: It was four over five.

"Are your interest changes after visit?

Kamil: Yes, definitely.

Buğra: Yes. I did not know the peacock was that beautiful.

Kerem: Yes. The binomial nomenclature was very interesting.

Here all students get motivated about animals after the field trip. All of them, regardless of their interest level in biology, reported that their interest was increased. All of them had got some memories about zoo and these memories seemed to increased their interest.

" Did the visit cause to think about biology after the visit?"

Kamil was concerned with animal behavior in captivity and he said that he wishes animal were more happy. Buğra also stated that he felt unhappy because of animal's psychological state. But he liked to see that animals were so diverse. Kerem was astonished by crocodile. He expected more energetic crocodile but he observed a sedentary one instead. He also astonished by the size of the giraffes.

"Do you think field trip is beneficial?"

Kamil said it was definitely beneficial. He stated that seeing is more understandable than reading. Buğra only said it was beneficial but he did not state any specific detail. Kerem said " it was beneficial because I understand binomial nomenclature better."

"Did visit change your opinion about biology lesson?"

Kamil: My interest in animals was increased.

Buğra: Yes. If Every lesson was a field trip, I would love biology lesson.

Kerem: Yes, it changes positively.

"How the visit could be more beneficial?"

Kamil and Buğra preferred laboratory experiments than a zoo. Kerem expected more information about animals in the zoo. He also wanted to see crab or elephant but he could not.

"Do you prefer classroom instruction or field trip?"

Kerem and Kamil preferred field trip. Buğra reported that there could be fifty percent classroom instruction and fifty percent field trip. He also added that social interaction among friends in the field trip effected biology learning positively.

4.3.8 Situation

"What situations force you to learn biology?" question was this theme's only question. Kamil reported that he enjoyed to learn new things. Buğra said the experiments and getting good grades. Kerem said "if there was a grading problem I would love biology. Especially plants and cell units were very enjoyable." Here grade anxiety is blocking his interest towards biology. Low self esteem (the feeling of "what if I failed?") could be the main problem of his lack of motivation.

4.3.9 Cost

This theme's question was "In order to reach a proper achivement on animal diversity unit level, how much time do you need to spend?". Every student answers this question in the same manner. All of them said they need to spend a lot of time.

4.3.10 Value

"How much do you think biology will be useful for your life?" was this theme's question.

Kamil: In order to have a liberal education, biology is important. In addition to that, if you have a knowledge about diseases, it would be more easy to prevent them.

Buğra: I don't think having an idea about animals will be useful for me. But knowledge about human is important. If I know what is happening in my body, it would be useful.

Kerem: It is important to get into a conversation.

4.3.11 Knowledge Level and Interest Relationship

"How has how good you are at biology influences your continuing motivation in biology?" was the question in this theme. Kamil said "it definitely effect my interest." Buğra also agrees with Kamil. Kerem reported a negative effect. If he get bad grades, he dislikes biology.

4.3.12 Social Influences

"How have the people in your life, such as friends, classmates, family, teachers and so forth influenced you continuing motivation in science?" Kamil pointed his biology teacher and her affect on his motivation. Kerem said "my mother is doctor. This creates a big pressure on me. So I do not like Biology anymore." Buğra's answer was similar to Kerem's. His sister is a medical student and that is why he dislikes biology.

Table 20 Summary of Semi-Structured Interviews

Questions	**Answers of the Students**		
	Student 1, "Kamil"	**Student 2, Kerem**	**Student 3, Buğra**
Interest in Biology	High	Mild	Low
Biology Activity Outside of Classroom	Frequently	Sometimes	Sometimes
Visits to Zoos, Museums, Aquariums	Constantly	Constantly	Constantly
Watch Documentaries	Constantly	Constantly	Rarely
Fallow a Science Website	Constantly	Constantly	Constantly
Read Science Magazines			
Future Plans	Biology related	Not related to biology	Not related to biology
Behavioral Attitude towards to Continue to Learn Biology			
Eager to learn biology related subjects outside of the classroom	Many subjects	Few subjects	No subject
Thoughts about Biology	Always fun	Smt. fun	Not fun

Table 20 (Continued)

Situation			
Situations that Make Them Learn Biology	Internal factors	Internal factors	External factors
Cost			
Time Needed to Succeed in Biology	A lot of time	A lot of time	A lot of time
Value			
Usefulness of Biology in Real Life	Health related, social and cultural	Health related	Social and cultural
Achivement on animal diversity unit Level and Interest Relationship	Affect positively	Affect positively	Affect negatively
Social Influences	Effect positively	Effect negatively	Effect negatively
Effect of Visit			
Interest level in animals before visit	High	Moderate	Low
Interest level in animals after visit	High	High	High
Think about visit at home	Yes, a lot.	Yes, a lot.	Yes, a lot.
Usefulness of the visit for school learning	Very useful	Very useful	Very useful
The effect of visit on biology attitude	Increase interest in animals	Make to think about animals a little bit	Increase interest in biology
Suggestions about visits to make it more effective	Suggestions about other trips	Suggestions about other trips	Suggestions about zoo visit
Prefer trip to a zoo or classroom instruction	Trip	Both	Trip

4.4 Analysis of Dialogues among Students During Field Trip

Six representative dialogic segments (RDSs) were extracted among all conversations. Every utterance protocol includes a biological theme (theme that is dominating the conversation) and process skill required by the conversation. Meta comment attempts to situate the utterance within the larger context of the dialogue and represented by the metabox. Below this is another box that suggests the origin of the thematic content which is the main subject of the biological theme (Ash, 2003).

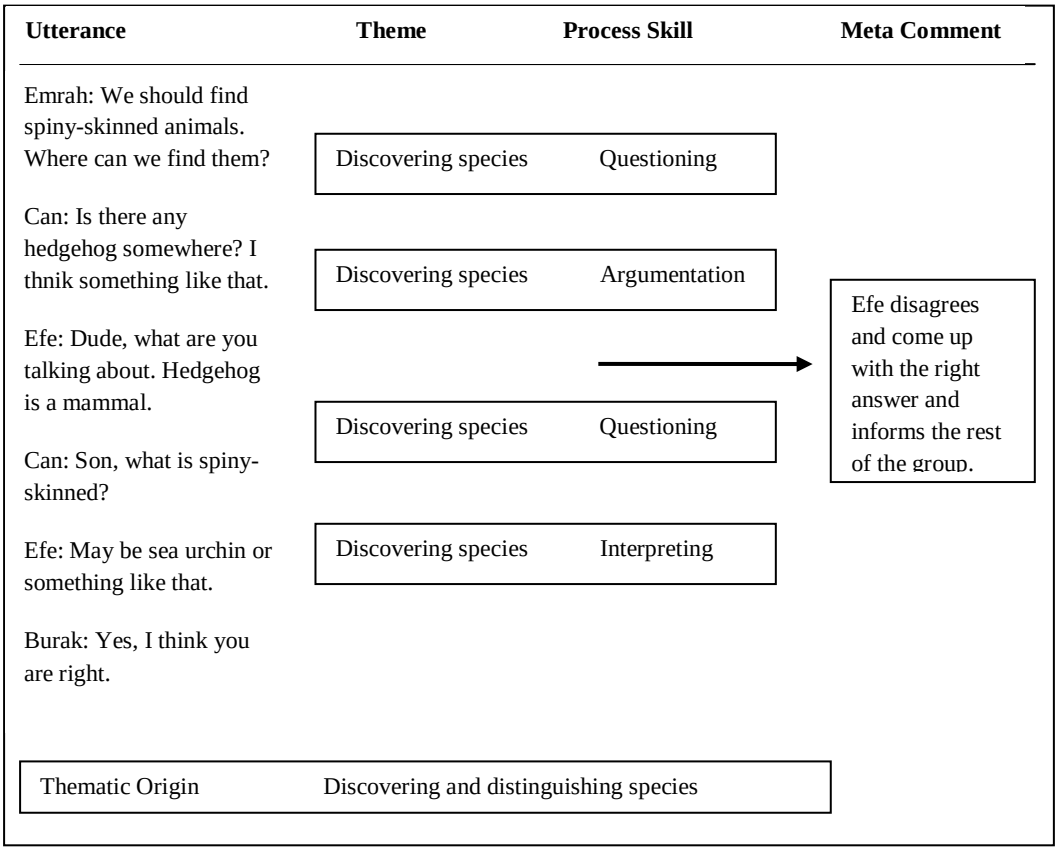


Figure 2 RDS 1, Distinguishing animals, Discussion, Peer scaffolding, 4 boys 3 girls, Age 15.

RDS1 is a representative of peer scaffolding as indicated in the Figure 4.1. According to Greenfield (1999), scaffold is providing support, it helps the student as a tool, and help student selectively. In this case, Efe was correcting his friends with his knowledge on echinodermata species. If he did not try to find a logical explanation to his peer's question ("Is there any hedgehog somewhere?"), Emrah, Can and Burak would continue to think that hedgehog is an echinodermata. In this conversation questioning, reasoning, argumentation and interpreting are the process skills performed by the students. By that way, without any assistance from group leader, they managed to distinguish species from each other.

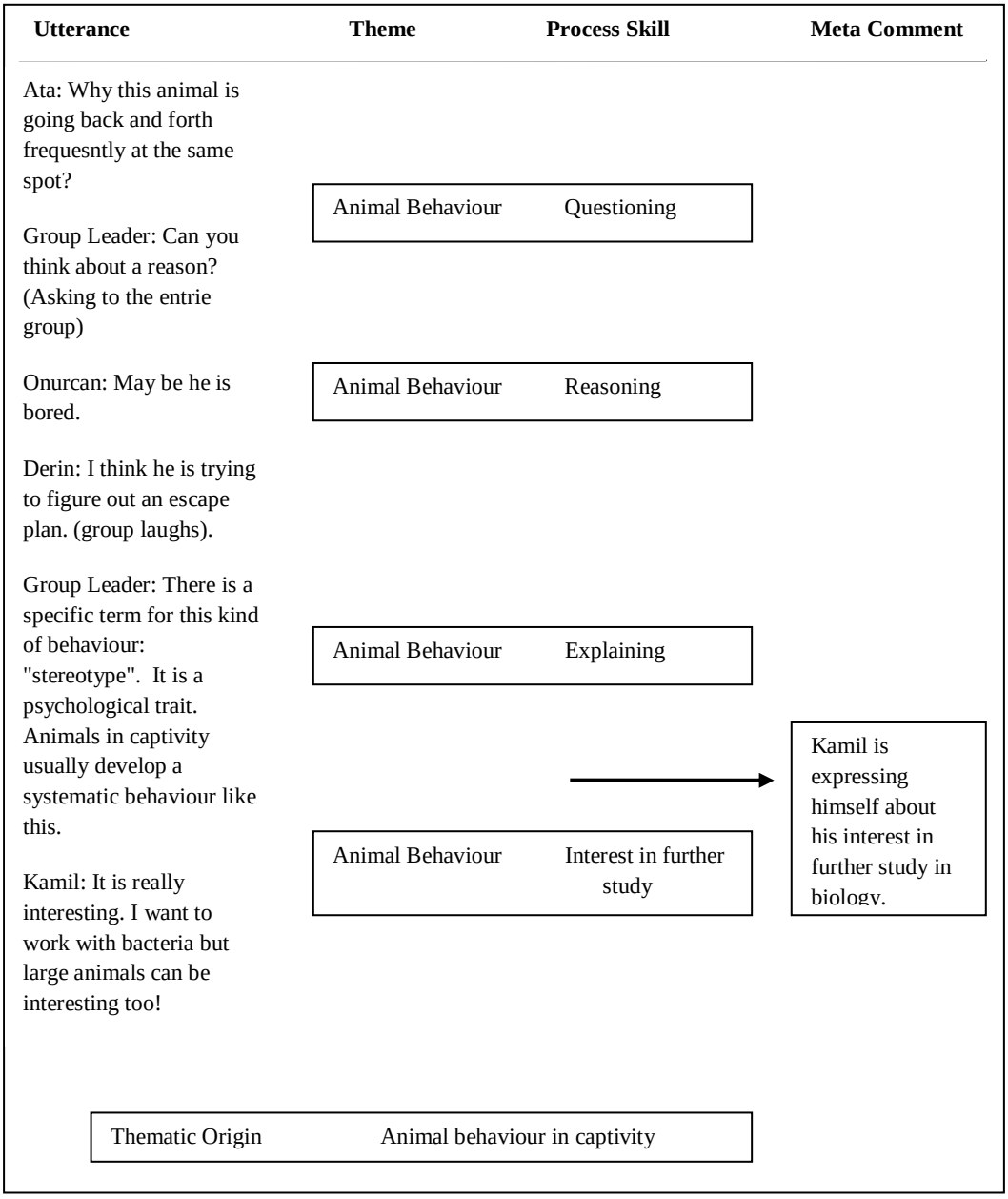


Figure 3 RDS 2, Animal Behavior, Reasoning, Continuing motivation.

3 Boys 3 Girls, Age 15 and 14, Group Leader, Age 30.

The second RDS was representative of leader scaffolding and it was about the animal behavior in captivity (Figure 4.2). Ata introduced the concept of animal behavior in captivity by using questioning and group leader encouraged students to think about it for a while with questioning. After some answers from students, leader introduced a new term "stereotype" and explained it. The scaffold provided by leader help students to learn new concepts, while observing it in daily life situation. This new knowledge exited Kamil and made him think that large animals could be interesting too. This conversation, via reasoning and questioning, help one of the students get motivated about one of the biological concepts, in this case, large animals.

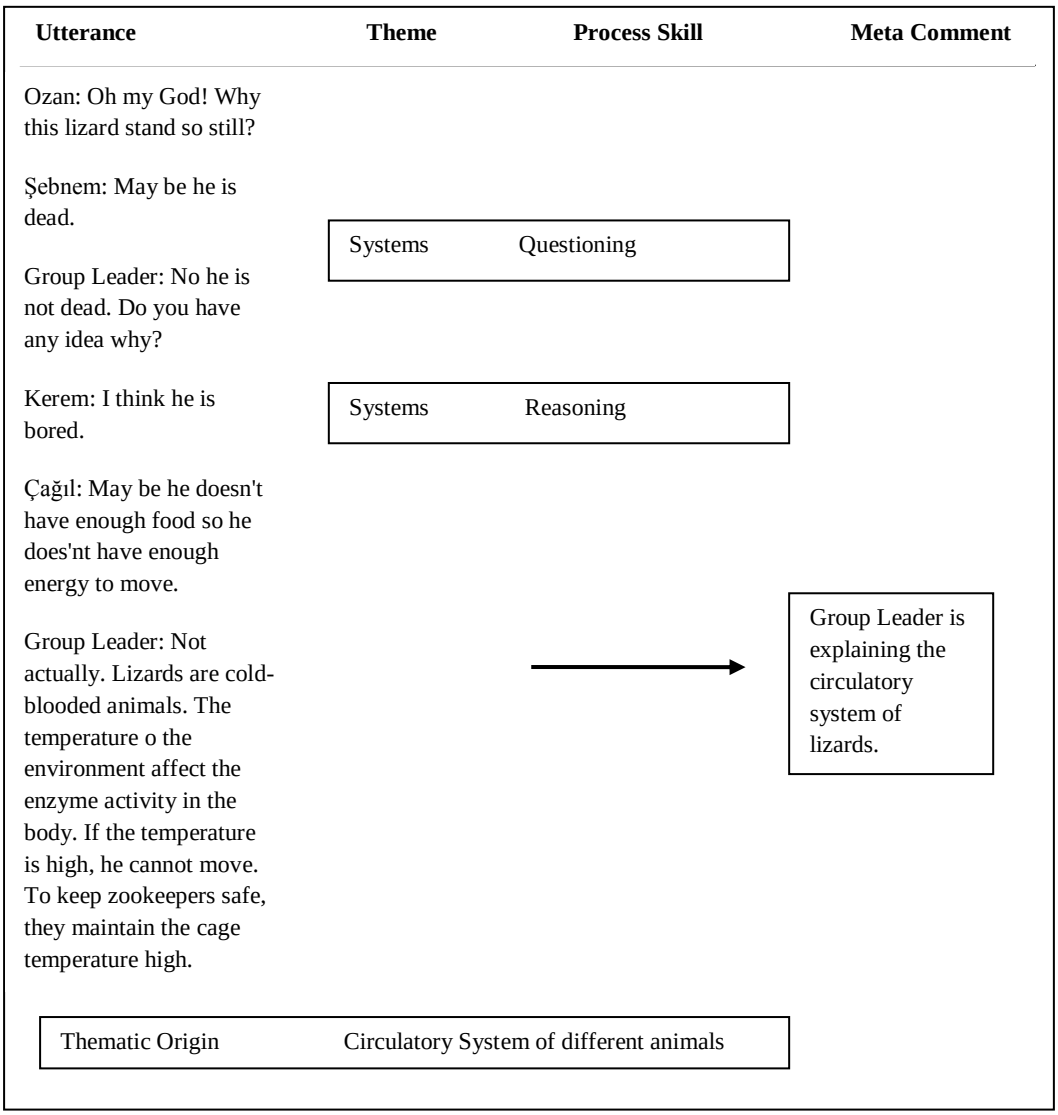


Figure 4 RDS 3, Systems, Reasoning, Scaffolding. 2 Boys 4 Girls, Age 15 and 14, Group Leader, Age 43.

The third RDS was about biological systems of different animals, in this case, a reptile (Figure 4.3). This is an example of leader scaffolding. In this conversation, group used questioning to make students think about the lizard's behavior. Students performed reasoning to come up with an explanation. When they

cannot reach a logical explanation, group leader explained the circulatory system of lizards. The learning process with this explanation supported by observation of real life situations. Reasoning and questioning were process skills.

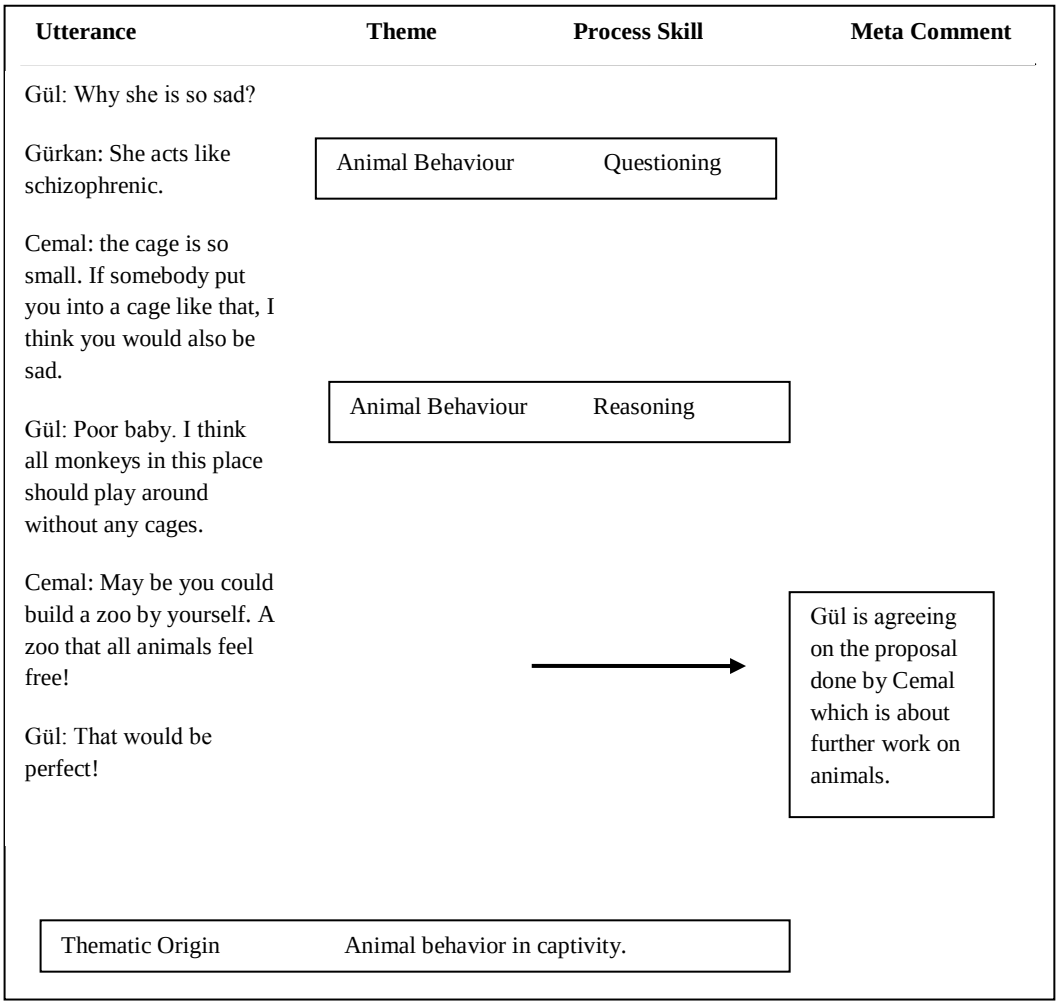


Figure 5 RDS 4, Animal Behavior, Reasoning, Continuing Motivation. 4 Boys 2 Girls, Age 15.

In RDS 4, the thematic origin was again animal behavior in captivity (Figure 4.4). In this small conversation, students were feeling sad about the animals and

their depression. Then Cemal used this feeling to encourage Gül to think further career plans on biology. Via questioning and reasoning, students were able to observe animal behavior with bare eyes, and this observation helped one of the students to think about biology related career.

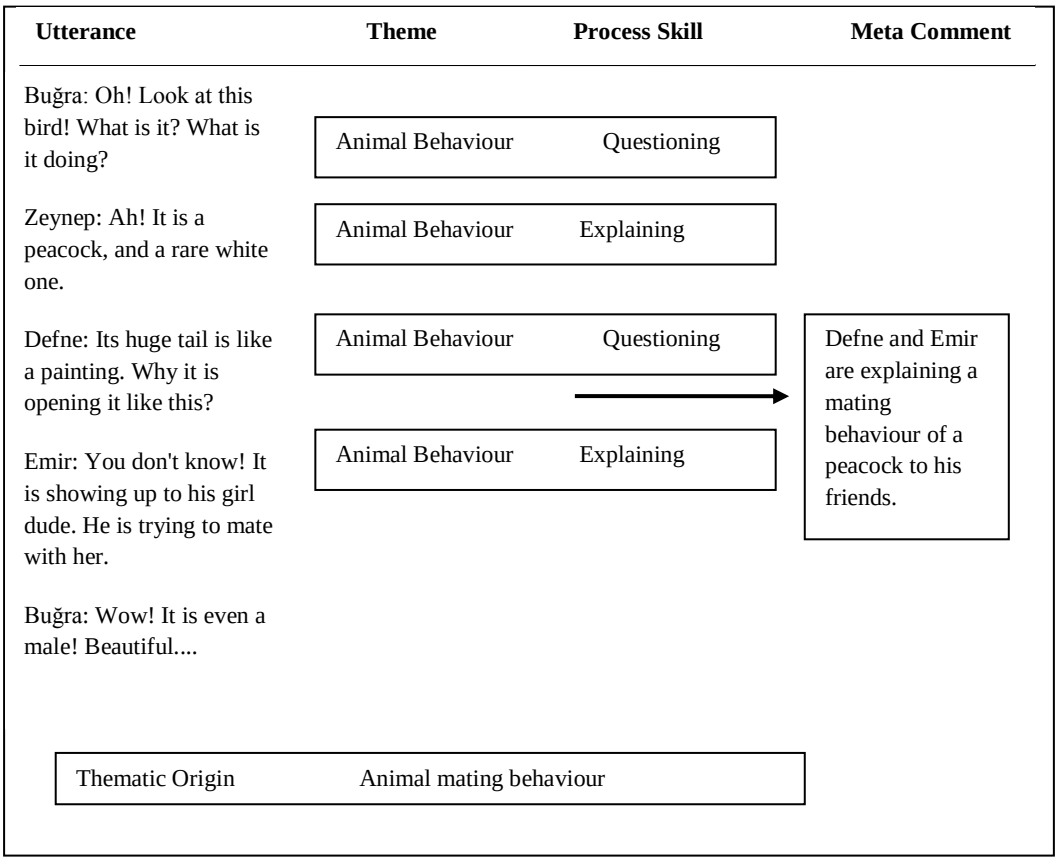


Figure 6 RDS 5, Animal Mating Behaviour, Reasoning, Peer Scaffolding. 4 Boys 2 Girls, Age 15.

The fifth RDS was again about peer scaffolding. The thematic origin was animals' mating behaviors. Buğra saw a peacock with its tail open first time in his life. Defne also doesn't know why he is opening his tail. They were using

questioning as process skill in order to learn the reason. Zeynep and Emir explained the reason behind this behavior to their friends. Here, daily life observation supported by a peer explaining make their friends learn a new concept about animal behavior.

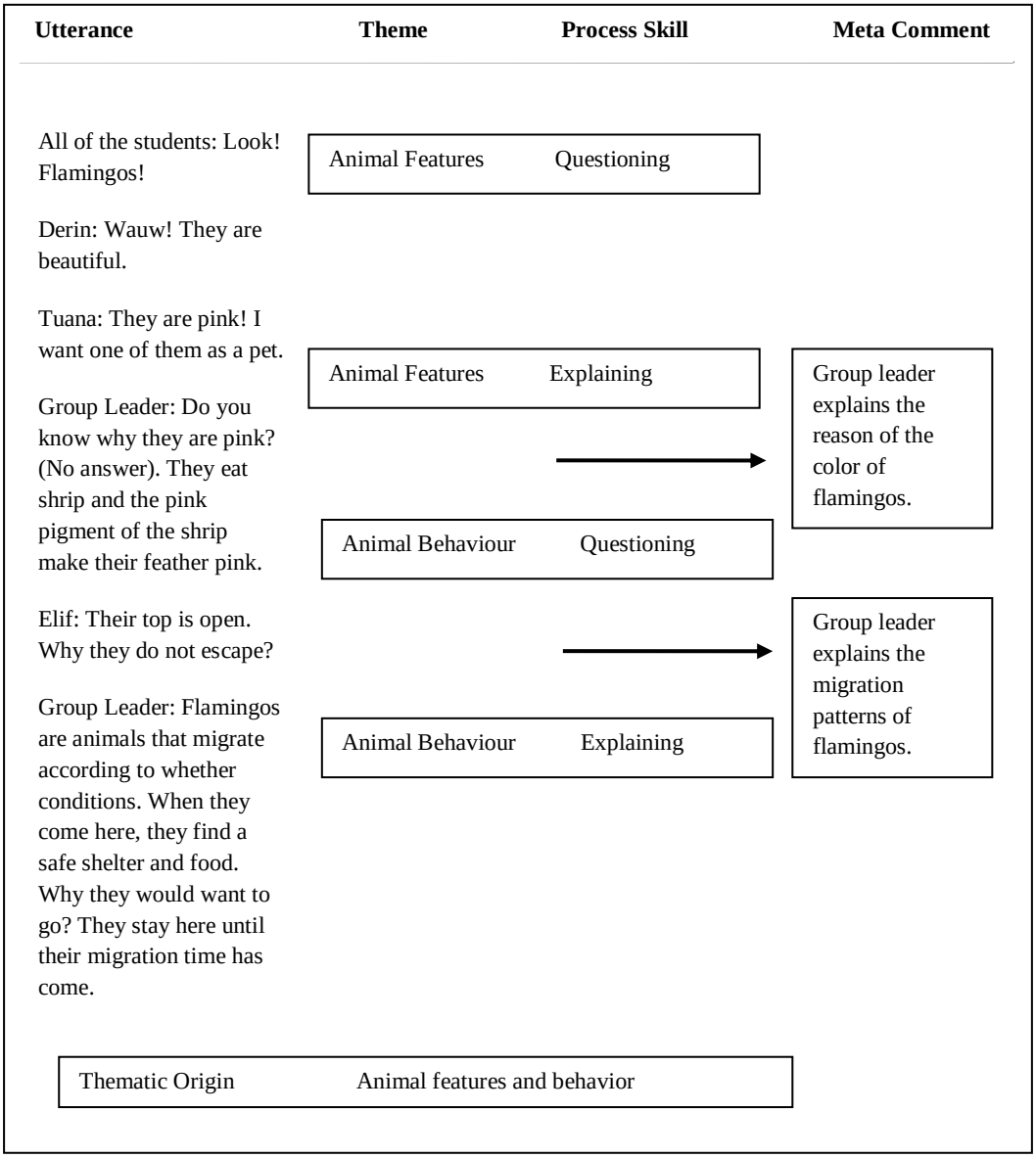


Figure 7 RDS 6, Animal Features and Behavior, Questioning, Explaining. 5 Boys 3 Girls, Age 15, Group Leader, Age 24.

As indicated in the Figure 4.6, the thematic origin of sixth RDS was about animal features and behavior. During the trip, all students astonished by the colors

and beauty of flamingos. Group Leader used this motivation in order to explain a biological concept to the students. In this case it was about the pigmentation pattern of the flamingos. Here questioning and explaining were the process skills. After this leader scaffolding, one of the students asked why flamingos escaped from the cage. Group leader again scaffold her students and explained the migration patterns of flamingos. Learning by observing in daily life situations again played a important role in this RDS. Students' learning supported by the first hand observation.

4.5 Summary of Results

Pre-test results showed that between experimental and control groups there was not a difference with respect to pre-ADAT and pre-CMTLBS. In addition, there was not a statistically significant mean difference between experimental and control groups with respect to pre-AMS's motivational factors. Therefore, the students in both groups were similar before treatment.

Post-test results shown that there was a significant mean difference between experimental and control groups with respect to post-ADAT and post-CMTLBS in favor of experimental group. Furthermore, there was significant mean differences among the six sub-factors of post-AMS except Amotivation. These results revealed that the effect of treatment could be observed in the experimental group with respect to six sub-factors of academic motivation, achievement on animal diversity unit and continuing motivation to learn biology. Only Amotivation results were not affected by the treatment in experimental group and there were no statistically significant mean difference between experimental and control groups.

Interviews were done with 3 students from the experimental group.. One student who got the highest score in ADAT, one student who got the average score in ADAT and one student who got the lowest score in ADAT were chosen. The results revealed that all three students with different achievement on animal diversity unit levels observed a positive effect on their motivational levels in biology lesson. The interview results also indicated that the achievement level of the students effects the students' external motivation positively however students with Intrinsic motivation could be affected negatively due to grade anxiety.

Dialogic inquiry was conducted in order to reveal the importance of social interaction during field trip in biology learning. Seven representative dialogic segments were analyzed. The results indicated that students' effect each other positively during field trip via conversation. Peer-scaffolding helped students to understand biological concepts more. Leader scaffolding was another important concept in field trip. Students could learn new concepts while observing these concepts in real life situations.

CHAPTER 5

DISCUSSION, IMPICATIONS AND RECOMMENDATIONS

5.1 Discussion of the Results

The aim of this study was to examine the effect of field trip oriented instruction on 9th grade students' achievement on animal diversity unit, continuing motivation to learn biology and academic motivation. The social impact of the field trip via analysis of dialogs among students during the trip was also investigated. In this chapter, the results of the study were discussed. In addition, internal and external validity, limitations, implications and recommendations were presented.

5.1.1. Pre- Test Results of ADAT, CMTLBS and AMS

In this study, pre-tests were administrated in order to address the prior achievement levels of the students in animal diversity unit, as well as continuing motivation levels and academic motivation levels of students before the treatment. The significance of group differences in pre-test scores on achievement on animal diversity unit and continuing motivation to learn biology were tested and the analysis revealed that the mean scores of control and experimental group on pre-

ADAT and pre-CMTLBS were not statistically different. The mean scores on pre-ADAT of control group was 9.82 and the mean scores on pre-ADAT of experimental group was 9.81. The mean scores on pre-CMTLBS of control group was 16.44 and the mean scores on pre-CMTLBS of experimental group was 16.02. Looking the minimum and maximum values that can be obtained from pre-BTK (min = 0, max = 20) and from pre-CMTLBS (min = 8, max = 32), the mean scores of both groups are average, indicating that the previous knowledge of both group on animal diversity unit and continuing motivation to learn biology were average before the treatment. Since there were no statistically different mean scores of pre-ADAT and pre-CMTLBS in terms of groups, it can be concluded that the situation for both experimental and control groups were same prior to the treatment.

The pre-test scores of AMS were tested in a different way. Since there was 7 sub-scales of the test and all seven sub-scales' scores were analyzed separately, every sub-scale's means were compared on MANOVA. For control group, mean scores for pre-AMOT, pre-IMTK, pre- IMTA, pre-IMES, pre-EMID, pre-EMIN and pre-EMER were 8.47, 16.12, 14.85, 12.85, 11.56, 15.14 and 16.47 respectively. For experimental group, mean scores for pre-AMOT, pre-IMTK, pre- IMTA, pre-IMES, pre-EMID, pre-EMIN and pre-EMER were 8.96, 16.49, 15.33, 12.83, 11.58, 14.88 and 16.57 respectively. Considering the minimum and maximum scores can be obtained from the sub-scales of AMS (min = 4, max = 28), the scores of both groups were below average. Thus, it can be concluded that students' academic motivation levels were statistically not different of control and experimental groups before treatment.

As it was stated, prior knowledge is the most influential predictor of academic achievement (Lawson, 1983). Thus, having the statistically not different mean scores of both groups could be concluded as the prior knowledge of both groups were at the same level before treatment. The effect of treatment could be

more explanatory with the same basis at both groups with respect to prior knowledge.

5.1.2 Post-test Results of ADAT

In post-test analysis, the post-ADAT was analyzed using Univariate ANOVA. The descriptive statistics revealed that post-ADAT mean scores of experimental group was 12.83, while control group's post-ADAT mean scores was 11.21. When minimum and maximum score that can be get from post-ADAT (min = 0, max = 20) were considered, the experimental and control groups' post-ADAT mean scores were slightly above the average for experimental and above average for control group. When descriptive statistics were compared, the increase between experimental groups' pre-ADAT (9.81) and post-ADAT (12.83) mean scores were higher than control groups' pre-ADAT (9.82) and post-ADAT scores (11.21). When Univariate ANOVA results were analyzed, post-ADAT results had statistically significant mean differences between control and experimental groups. Therefore, the field trip oriented instruction had a more significant effect on achievement on animal diversity unit than traditionally design biology instruction and we reject the Null Hypothesis 1. The findings obtained from this study were consistent with other studies, referring that field trip oriented instruction had a more positive effect on academic achievement (Bozdoğan and Yalçın, 2009; Doğan, Çavuş and Güngören, 2011; Nundy, 1999). When students actively involved in the learning process, and they observed the real life situations in the first hand, they were stimulated to learn, as Krajcik and Sutherland (2010) proposed.

The power of observation in learning was expressed in various studies (Michalski and Stepp, 1983; Tkach et al., 2008; Meltzoff 2007; Armantier, 2004). Especially when students need to construct knowledge about classification (in this

case, animal classification) learning from observation was explained as key concept (Michalski and Stepp, 1983). Learning by doing, seeing and observing were reported as valuable effects on visitors' learning (Csikzentmihalyi and Hermanson, 1999).

When biology education is considered, observing live animals instead of photographs or preserves specimens, influences cognitive and affective learning to a greater extend (which was measured by changes in attitude) (Sherwood Jr. et. al., 1989). Current study supports the findings of Sherwood and his colleagues' results, as learning from zoo by observing living organisms effects learning positively.

It was proposed that animated activity of animals in zoos elicit the visitor attention most and in turn potentially facilitates visitor learning (Joanne, 1998). When students observed the animal activity such as peacocks' mating behavior (see Chapter 4), their attention was caught more easily and they eventually started a conversation about this activity. This conservation, in turn, facilitates learning about animal behavior.

In the study of Clyton et al. (2009), perceived positive connections with visitors and animals in zoos were combined to conservation acts, and they concluded that a visit to the zoo become a effective experience to help visitors interested in nature. These findings are inconsistent with the study's findings, since students who observe animals in the zoo experienced positive emotional arousal and their interest in animals increased after the visit.

When the dialogues among students were analyzed, it can be observed that students shared their ideas via questioning, reasoning and explaining during field trip. These dialogues were both peer interaction and teacher-student interaction. In the study of Watson and his colleagues (2002), it was claimed that social interaction between peers motivated students for further inquiry. Schauble et al. (1997) reported that meaningful learning derived from social interaction. Interaction among visitors,

such as peer interaction or student- teacher interaction, enrich learning in cognitive and affective level (Adelman, Falk and James, 2000; Dewitt and Storsdieck, 2008; Tofied et al., 2003).

As Emmons (1997) proposed, interactions among students and teachers played an important role in science learning. Through social interaction, students developed a different understanding about animals, interchanged their ideas about animals, via discussions, they gained a different point of view. Many students learn new concepts while they were observing animals.

5.1.3 Post-test Results of CMTLBS

In post-test analysis, post-CMTLBS were analyzed using Univariate ANOVA. For post-CMTLBS, experimental group's mean score was 21.09 and control group's mean score was 17.50. When minimum and maximum score that can be obtained from post-CMTLBS (min = 8, max = 32) were considered, the experimental and control groups' post-CMTLBS mean scores were high for experimental and above average for control group. When descriptive statistics were compared, the increase between experimental groups' pre-CMTLBS (16.02) and post-CMTLBS (21.09) mean scores were higher than control groups' pre-CMTLBS (16.44) and post-CMTLBS scores (17.50). When Univariate ANOVA results were analyzed, post-CMTLBS had statistically significant mean differences between control and experimental groups. Therefore, the field trip oriented instruction had a more significant effect continuing motivation to learn biology than traditionally design biology instruction. Thus, we reject the Null Hypothesis 2. One of the studies done by Pascarella and his colleagues (1981), it was revealed that teacher control had a negative effect on continuing motivation. During the field trip, students had

their own pace and the control of the authority decreased. Thus, increase in continuing motivation results after the field trip can also be explained in this manner.

The results obtained from interview questions supporting these quantitative findings. All of three students, regardless of the previous achievement levels, reported that field trip had a positive effect on their attitude towards animals. All of them claimed that they thought about the visit at home. Thinking about a school activity other than the school hours without any requirement was a good indicator of continuing motivation (Maehr, 1976; Toprac, 2008). As in the study of Luke, Coles and Falk (1998) in which families discussed their visit to a museum during dinner, in the car or in different situations, students of this study tried to connect the context of the exhibition with everyday life situations.

Analysis of the dialogues during the field trip also revealed that field trip promotes continuing motivation on students. As indicated in RDS 2 (see Chapter 4 for detail), one of the students in the group motivated his friend to continue working on animals as future plans. RDS 4 also revealed a similar pattern. After a discussion about animal behavior in captivity, one of the students planned to build a zoo which is more comfortable for animals. Her career options were enlarged by this dialogue. These findings were in line with the proposition of learning in informal learning institutions provide different point of view for students during the learning experience (Marshdoyle et al., 1982).

According to the findings of the dialogic inquiry, the conversation between the group members in this study fostered science understanding as well as curiosity as indicated by Crowley and Galco (2001).

As in the study of Borun and his colleagues' (1998), in which groups indentify, describe, interpret and apply the concepts they learn from visit, the

students in this study indentified the animals and their features, describe the similarities and differences between animals, interpreted their understanding about animal behavior and diversity and applied what they learned in post-visit activity in the classroom.

In conclusion, field trip oriented instruction had a positive effect on students' motivation to learn scientific concepts, as proposed by many other researchers (Falk, 1983; Koran et al., 1989; Csikszentmihalyi and Hermanson, 1999; Tuckey, 1992; Marshdoyle et al., 1982; Tofield et al., 2003).

5.1.4 Post-test Results of AMS

For post-AMS scores, MANOVA was conducted when each sub-scale mean scores were used as dependent variables. Since there was 7 sub-scales of the test and all seven sub-scales' scores were analyzed separately, every sub-scale's means were compared on MANOVA.

When the MANOVA results were analyzed, except post-AMOT and post-EMER, all other sub-scale mean scores were statistically different between experimental and control groups, in favoring the experimental group positively. The post-test results of amotivation sub-scale has no statistically mean difference between control and experimental groups, as well as there no obvious difference between pre and post-test results (pre-AMOT (8.47) and post-AMOT (8.47) of control group and pre-AMOT (8.96) and post-AMOT (8.79) of experimental group). Therefore, neither traditional instruction nor field trip oriented instruction had a positive or negative effect on amotivation. Thus, we fail to reject the Null Hypothesis 9. It was expected that field trip oriented instruction had a negative

effect on amotivation scores, but it was not the situation. Students who are not motivated to academic activities remained non motivated. Amotivation is serious construct that need to deal with in detail and for long periods of time (Vallerand et al., 1989). A four-week instructional process of this study may not sufficient enough to motivate amotivated students. For amotivated students, it was reported that teachers should maintain caring and supportive classroom environment (Lumsden, 1994). To help unmotivated students, she suggested a process called "attribution retraining" which involves modeling, socialization and practice exercises. She also suggested that school-level policies should focus on learning and task master rather than relative performance and competition. Since the situation in our country is opposite of this explanation, motivating amotivated students need more focus on long term policies, besides small scale efforts such as enriching curriculum with field trips.

For external motivation - external regulation (EMER), which is the closest to the amotivation in self-determination scale, the control (pre-EMER (16.47) and post-EMER (16.47) of control group and pre-EMER (16.57) and post-EMER (16.45) of experimental group), there was no obvious mean difference between pre and post-test results of AMS when control group was considered. The situation was similar with experimental group. These results indicated that the field-trip oriented instruction had no effect on motivating students when external regulation was indicated. Thus, we fail to reject the Null Hypothesis 8. External regulation was about having a better job to gain more money in the future (Deci and Ryan, 1985). Since Extrinsic Motivation External Regulation was the closed value to Amotivation in the Self-Determination Continuum, it was expected to have no increase after field trip oriented instruction. External regulation is the least autonomous motivational treat in Self - Determination Continuum (Deci et al., 1991). Because of the pressure on teachers (university entrance examination pressure is the main pressure teacher

face nowadays), they have difficulties to create more autonomous classrooms (Reeve, 2009). Again, the overall policy about education should face a renewal in order to create more autonomous students and shift externally regulated students to intrinsically motivated ones.

For external motivation - introjected regulation (EMIN), the control (pre-EMIN (15.14) and post-EMIN (16.44) of control group and pre-EMIN (14.88) and post-EMIN (20.23) of experimental group), there was a statistically significant mean difference between control and experimental groups, when post-tests were considered. Thus we reject the Null Hypothesis 7. The meaning of these results could be students were motivated positively when introjected regulation was considered with field-trip oriented instruction. For external motivation - identified (EMID), the control pre-EMID (11.56) and post-EMID (10.94) of control group and pre-EMID (11.58) and post-EMID (14.13) of experimental group), there was a statistically significant mean difference between control and experimental groups, when post-tests were considered. When the mean scores of pre-EMID and post-EMID of experimental and control groups were examined, it can be concluded that the mean differences between pre and post-test of control group was obviously less than the mean differences between pre and post-test scores of experimental group. Then, it can be concluded that we reject the Null Hypothesis 6. Thus, field trip oriented instruction had a positive effect on students' external motivation, when identified sub-factor was considered. It was reported that, extrinsic motivation could be used to trigger intrinsic motivation. If educators deal with multidimensional nature of motivation such as externally triggered interest and performance goals, academically unmotivated children could be motivated (Hidi and Harackiewicz, 2000). The relation of intrinsic and extrinsic motives could be used to answer human needs for autonomy, competence and relatedness, as Ryan and Deci (2000) proposed. The increase in the results of extrinsic motivational sub-factors such as

indentified and introjected regulation due to field trip could be then used as supportive dimensions while trying to motivate students intrinsically.

For intrinsic motivation - experience stimulation (IMES), the control (pre-IMES (12.85) and post-IMES (12.79) of control group and pre-IMES (12.83) and post-IMES (15.85) of experimental group), there was a statistically significant mean difference between control and experimental groups, when post-tests were considered. These findings imply that field trip oriented instruction had a positive effect on students' intrinsic motivation when to experience stimulation sub-scale was considered. Thus we reject the Null Hypothesis 5. For intrinsic motivation - towards accomplishment (IMTA), (pre-IMTA (14.85) and post-IMTA (17.33) of control group and pre-IMTA (15.33) and post-IMTA (18.87) of experimental group), there was a statistically significant mean difference between control and experimental groups, when post-tests were considered. However, when the mean scores of pre-IMTA and post-IMTA of experimental and control groups were examined, it can be concluded that the pre-test scores were less than post-test scores, meaning treatment, traditional or field trip oriented, had a positive effect on students' intrinsic motivation towards accomplishment. Thus we reject the Null Hypothesis 4. For intrinsic motivation - to know (IMTK), (post-IMTK (17.12) of control group and post-IMTK (21.11) of experimental group), there was a statistically significant mean difference between control and experimental groups, when post-tests were considered. Thus we reject the Null Hypothesis 3. It was the highest post-test score of experimental group among all sub-scales, indicating that field-trip had a most positive effect on intrinsic motivation to know, which is the highest point in the self-determination continuum (Deci and Ryan, 1987). It was proposed that intrinsically motivated behaviors represent self-determination (Deci et al. , 1991). Thus, field trip oriented instruction had a positive effect on self-determination of the students which is an indication of intrinsic motivation. The findings of this study consistent

with the national and international studies, which are proposing that field trips to zoos or other wild life parks effect motivational levels of students, and then, in turn, effects academic achievement (Falk et. al., 2004; Stevenson, 1991; Anderson, 2000; Cengiz and Kebapınar, 2010).

Interview analysis revealed the similar pattern on students' intrinsic motivation levels when field trip was considered. Regardless of achievement levels, all students reported that field trip increased their interest in biology, and they added that all of them thought about the trip at home, without any school requirements. Buğra, with the lowest achievement level, confessed that if there would be no grade pressure, the biology would be more interesting to him. He answered to the question "How the field trip could be more useful?" as "the labels of animals could include more information". This could be an indication that he wanted to learn more about biology, just because "he want to learn", not to get good grades. On the contrary, if grade issues are included, he lost his interested in biology. This interesting interpretation indicates that students' intrinsic motivation could be triggered by field trips even with students with low achievement levels. Since field trip was considered as an opportunity for active learning, self-controlled real world experiences and proposed a ground for social interaction (Rickinson et al., 2004), the findings of this study consistent with previous studies' findings.

5.2 Internal Validity

The consideration of the possible treats to internal validity in the results evaluation of experimental study is extremely important (Frankel and Wallen, 2003). The possible treats to internal validity are, subject characteristics, location,

mortality, testing, instrumentation, history, maturation, attitudinal effect, regression and implementation. Controlling these treats as much as possible increases the possibility of detecting a significance difference between the groups due to the treatment.

Subject characteristics treat is the major treat since groups, not individuals were selected and the individuals were not assigned to groups randomly. This limits the control of subject characteristics. Thus previous knowledge, age, motivational levels may affect the results of the study. To control this treat, previous knowledge on animal diversity and motivational levels on biology were tested before treatment. The experimental and control group students were not different from each other with respect to prior knowledge on animal diversity and motivational levels on biology and age.

Location treat is on action when different contexts were used in carrying out the intervention or collecting the data. Since our experimental treatment is about a field trip, location is actually a independent variable for this study. Thus, this treat is not treat but an experimental factor instead in the study.

Mortality treat is defined as loss of subject. In order to eliminate this treat, missing data analyses were done.

Testing treat could be defined as the effect of increase in post-test is because of pre-test. Because both groups were pre-tested at the same time before the post-test was administrated, the effect of testing is controlled.

Instrumentation occurs when the nature of scoring procedure of the instruments during the study has changed. In this study, there was no change in the nature of scoring.

History treat is in action when unanticipated or unplanned events affect the responses of the subjects. The researcher was at school and was in the field trip and also was together with the students during data colleting procedure. There was no any unanticipated or unplanned event effecting the subjects during the study.

Maturation treat occurs an improvement is observed because of assessing time. In this study, all students were at the same grade level and age. During the process of this study, any change on students due to age and experience was expected to be same. Thus, maturation was not a serious threat to this study.

Attitudes of subject treat occur when the subjects view the treatment as a new concept. In this study, students in the experimental group were aware of the field trip oriented instruction. Their teacher were explaining the treatment before the field trip several times in order to not to make the trip novel. Control group, on the other hand, was in another school and they had no idea about the trip.

Implementation treat was controlled by the training of teachers about treatment in both experimental and control groups. During the field trip, the researcher was with the students all the time in order to control the implementation treat. In addition, control group's teacher was explained the lesson plan very carefully and after the implementation, a report about the lesson was given to the researcher.

Regression treat was not a problem in this study since it occurs in the studies with one group. There was a control group in this study in order to compare the effect of treatment.

The ethical issues were also taken into consideration in this study. It did not cause any physical or psychological harm, discomfort or danger. The proposal of this study, the instruments and the treatment was examined by the ethical committee

of the university. the committee found all the procedures and instruments of this study ethic. In addition, only the initial names of the students were asked in order to match students from different instruments. Not the real names of the students but the pseudo names were used in the interview part and dialogic inquiry part just to differentiate the students from each other. Parents of all students' were signed a permission letter (see Appendix N). In addition, it was ensured that no one else except the researcher had a chance to access the data and the results was only used for research purposes.

5.3 External Validity

External validity means the how the data obtained from this study can be generalized beyond the sample (Frankel and Wallen, 2003).

In this recent study, convenience sampling was the sampling method due to difficulties of random sampling in Turkish educational system. Convenience sampling cannot be considered as a representative of the population. The target population of this study was Ankara and accessible population was Çankaya. There were 26 private high schools in Çankaya district and there were approximately 2000 9^{th} grade students who were thought biology. The sample of this study was 87 students from two different high schools. The number of the sample represents 4.35 % of the accessible population. Because the representative proportion low and convenience sampling technique was used in this study, it can be said that the population generalizability of this study was limited.

The sample of this study composed of students baring average previous knowledge about animal diversity unit of biology lesson. The students' age range

from 14 to 16. The schools were located in urban environment with both having well-equipped campuses for learning. The study was done in the second semester, with the months of March, April, May and June of 2012. There were between 16 - 24 students in each class. Thus, this study can be generalized to other high schools having similar features.

5.4 Implications

The results of this study can effect to Turkish biology education by introducing the field trip oriented instruction to the educators. There was not much study about the field trip oriented instruction in the high school biology education. The findings could also be a guideline to teachers, textbook writers and curriculum developers in Turkey and other countries when designing an effective biology education in the animal diversity unit. Field trip could be an integral part of high school biology curriculum in order to increase the motivational levels of the students about biology. Teachers should give the students the opportunity to observe biological concepts in daily life situations with the help of field trips. This might help students to retain the biological concepts more easily and more reluctantly.

In recent years, the high school biology curriculum was revisited and became more student-centered. Activities, laboratory experiments, portfolio presentations were included in the curriculum. However, teachers who get used to traditional teaching methods could not find student-centered activities much. Field trip oriented instruction could be a student centered alternative for animal diversity unit.

5.5 Recommendations

According to the results of this study, the following suggestions can be done:

1. Similar studies can be done with a larger sample size and in different high schools for the generalization of the findings to a larger population.

2. The field-trip oriented instruction can be applied to different grade levels.

3. The field-trip oriented instruction can be applied to different biology units.

4. This study was a short term study, including one biology unit. Long-term studies of field-trip oriented instruction can be tested at different grade levels with different biology topics.

5. Further research can be conducted in order to reveal the effects of field-trip oriented instruction on students' attitudes towards science, science process skills and critical thinking skills.

6. Further research can be conducted in order to reveal the gender differences among the students, when effects of field-trip oriented instruction on students' motivational levels and academic achievement are tested.

7. Further research in which field-trip oriented instruction classes observed could be carried out.

REFERENCES

Adelman, L. M., Falk, J. H. & James, S. (2000). Impact of national aquarium in Baltimore on visitors' conservation attitudes, behavior and knowledge. *Curator: The Museum Journal*, *43*(1), 33-61.

Akbaş, A. & Kan, A. (2007). Affective factors that influence chemistry achievement (motivation and anxiety) and the power of these factors to predict chemistry achievement - II. *Journal of Turkish Science Education, 4*(1), 10-19.

Allen, S. (2004). Designs for learning: Studying science museum exhibits that do more than entertain, *Science Education*, *88*(1), 17-33.

Anderman, E. M., & Young, A.L. (1994). Motivation and strategy use in science: Individual differences and classroom effects. *Journal of Research in Science Teaching*, *31*(8), 811-831.

Anderson, D. (2003). Visitors' long-term memories of world expositions. *Curator*, *46*, 401-420.

Anderson, D., Lucas, K. B., and Ginns, I. S. (2003). Theoretical perspectives on learning in an informal setting. *Journal of Research in Science Teaching, 40*, 177-199.

Armantier, O. (2004). Does observation influence learning?, *Games and Economic Behavior*, *46*(2), 221-239.

Ash, D. (2003). Dialogic inquiry in the life science conversations of family groups in a museum. *Journal of Research in Science Teaching, 40*, 138-162.

Ash, D. & Wells, G. (2006). Dialogic inquiry in classroom and museum: Actions, tools and talk. In Z. Bekerman, N. C. Burbules and D. S. Keller (Eds), *Learning places: the informal education reader.* New York: Peter Lang Publishers.

Ballentyne, R. & Packer, J. (2002). Nature-based excursions: School students' perceptions of learning in natural environments. *International Research in Geographical and Environmental Education, 11*(3), 218-236

Bamberger, Y. & Tal, T. (2007). Learning in personal context: Levels of choice in a free choice learning environment in science and natural history museums. *Science Education, 91*(1), 75-95.

Barker, S. & Elliott, P. (2000). Planning a skills-based resource for biodiversity education. *Journal of Biological Education, 34*(3), 123-227.

Borun, M., Dritsas, J., Johnson, J. I., Peter, N. E., Wagner, K. F., Fadigan, K., Jangaard, A., Stroup, E., & Wenger, A. (1998*). Family learning in museums: The PISEC perspective.* Philadelphia, PA: The Franklin Institute.

Bozdogan, A. E., & Yalçın, N. (2009). Determining the influence of a science exhibition center training program on elementary pupils' interest and achievement in science. *Eurasia Journal of Mathematics, Science and Technology Education*, *5*(1), 27-34.

Brody, M, W. Tomkiewicz & C. Graves, (2002) Park Visitor's Understanding, Values and Beliefs Related to Their Experience at Midway Geyser Basin, Yellowstone National Park, USA, *International Journal of Science Education, Special Edition on Environmental Education*, *24* (11), 1119-1141.

Brown, Collins and Duguid (1989) Situated Cognition and the Culture of Learning, *Educational Researcher*, *18*, 32-42.

Cengiz, C. & Kabapınar, F. (2011). Evaluation of the field trips to environments for informal learning: case of "Energy Park". *Western Anatolia Journal of Educational Science. 1308* (8971), 197-202.

Clayton, S., Freaser, J. & Saunders, C. D. (2009) Zoo experinece: conservations, connections and concern for animals. *Zoo Biology, 28*(5), 377-397.

Cockley, K. O. (2000). Examining the validity of the academic motivation scale by comparing scale construction to self-determination theory. *Psychological Reports, 86*, 560-564.

Cordova, D. I., & Lepper, M. R. (1996). Intrinsic Motivation and the Process of Learning: Beneficial Effects of Contextualization, Personalization, and Choice. *Journal of Educational Psychology, 88*(4), 715-730.

Crowley, K., Callanan, M. A., Jipson, J. L., Galco, J., Topping, K. & Shrager, J. (2001). Shared scientific thinking in everyday parent-child activity. *Science Education, 85*, 712-732.

Crowley, K., & Galco, J. (2001). Everyday activity and the development of scientific thinking. In K. Crowley, C. D. Schunn, and T. Okada (Eds.), *Designing for science: Implications from everyday, classroom and professional settings* (393-413). Mahvah, NJ: Lawrence Erlbaum Associates.

Csikszentmihalyi, M. & Hermanson, K. (1999). Intrinsic motivation in museums: why does one want to learn? In H. Greenhill (Ed). *The educational role of the museum.* Routledge, New York.

Çimer, A. (2007). Effective Teaching in science: a review of literature. *Journal of Turkish Science Education, 4*(1), 20-44.

Davidson, S. K., Passmore, C., & Anderson, D. (2009). Learning on zoo field trips: the interaction of the agendas and practices of students, teachers and zoo educators. *Science Education. 94*(1), 122-141.

Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, *18*, 105–115.

Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determinaton in human behaviour*. New York: Plenum.

Deci, E. L. & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality & Social Psychology*, *53*, 1024–1037.

Deci, E. L.; Vallerand, R. J.; Pelletier, L. G. & Ryan, R. M. (1991). Motivation and Education: The Self-Determination Perspective. *Educational Psychologist*, *26*, 325-346.

Derry, S. J. (1999). A Fish called peer learning: Searching for common themes. In A. M. O'Donnell and A. King (Eds.), *Cognitive perspectives on peer learning* (197-211). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Devetak, I. & Glazar, S. A. (2010). The influence of 16-year-old Students' gender, mental abilities, and motivation on their reading and drawing submicrorepresentations achievements. *International Journal of Science Education*, *32*(12), 1561-1593.

Doğan, N., Çavuş, S. & Güngören, S. (2011). Investigating science concepts in the museum like treasure hunting. *Creative Education, 2*, 1-9.

Driver, R. & Bell, B. (1986). Students' thinking and the learning of science: A constructivist view. *School Science Review, 67*, 443-356.

Driscoll, J. (1994) Reflective practice for practise. *Senior Nurse, 13*, 47 -50.

Duit, R. & Treagust, D. F. (1998). Lerning in science- From behaviorism toward social constructivism and beyond. In B. J. Fraser and K. G. Tobin (Eds.), *International handbook of research in science education* (pp. 3-2). Dordrecht, the Netherlands: Kluwer Academic.

Dworkin, G. (1988). *The theory and practice of autonomy.* New York: Cambridge University Press.

Ebel, R.L. & Frisbie, D.A. (1991). *Essentials of Educational Measurement* (5th ed). Englewood Cliffs, NJ: Prentice Hall.

Eccles, J. S., & Wigfield, A. (2002). Motivational Beliefs, Values, and Goals. *AnnualReview of Psychology, 53*(1), 109-132.

Ellenborgen, K. M. (2002). Museums in family life: an ethnographic case study. In G. Leinhardt, K. Crowley, and K. Knutson (Eds.), *Learning conversations in museums* (81-101). Mahvah, NJ: Lawrence Erlbaum Associates.

Ellenbogen, K.M. (2003). From dioramas to the dinner table: An ethnographic case study of the role of science museums in family life. *Dissertation Abstracts International, 64*(03), 846A.

Ernest, P. (1999). *Social Constructivism as a Philosophy of Mathematics: Radical Constructivism Rehabilitated?,* Retrieved from http://www.ex.ac.uk/~PErnest/soccon.htm

Eryılmaz, A., Yıldız, İ., & Akın, S. (2011). Investigating of relationships between attitudes towards physics laboratories, motivation and amotivation for the

class engagement. *Eurasian Journal of Physics and Chemistry Education* (Special Issue), 59-64.

Falk, J.H. (1983). Field trips: a look at environmental effects on learning. Journal of *Biological Education, 17*, 137-141.

Falk, J. H. (2001). *Free-choice science education: How we learn science outside of school*. New York: Teachers College Press.

Falk, J. H., & Dierking, L. D. (1992). *The museum experience*. Washington: Whalesback Books.

Falk, J. H., & Dierking, L. D. (2000). *Learning from museums: Visitor experiences and the making of meaning*. Walnut Creek, CA: AltaMira Press

Falk, J. H., Koran, J. J. Jr. & Dierking, L. D. (1986). The things of science: Assesing the learning potential of science meseums. *Science Education, 70*, 503-508.

Field, A. (2009). *Discovering Statistics Using SPSS, 3rd edition*. London: SAGE Publications.

Finson, K. D. & Enoch, L. G. (1987). Student attitudes toward science-teaching-society resulting from visitation to a science technology museum. *Journal of Research in Science Teaching, 24*, 593-609.

Gardner, H. (1995). Reflections on multiple intelligences, *Phi Delta Kappan 77*(3), 200-209.

Gagne, M. & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behaviour, 26*, 331-362.

Gayford, C. (2000). Biodiversity Education: A teacher's perspective. *Environmental Education Research. 6*(4), 347-361.

Graham, S. & Weiner, B. (1996). Theories and principles of motivation. In D.C. Berliner & R.C. Calfee (Eds.). *Handbook of Educational Psychology (*63-84), New York: Macmillan.

Gredler, M. E. (1997). *Learning and instruction: Theory into practice* (3rd ed). Upper Saddle River, NJ: Prentice-Hall.

Griffiths, T. & Moon, B. (2000). Switching From Teaching To Learning, BioEd 2000, The Challenge of the Next Century, Proceedings of the International Symposium, Retrieved from http://archive.concord.org/intl/cbe/pdf/griffiths.pdf

.Greenfield, P.M. (1999). Historical change and cognitive change: A two-decade follow-up study in Zinacantan, aMaya community in Chiapas, Mexico. *Mind, Culture, and Activity, 6*, 92–98.

Glynn, S. M., and Duit, R. (1995). Learning science meaningfully: Constructing conceptual models. In S. M. Glynn & R. Duit (Eds.), *Learning science in the schools: Research reforming practice* (3-33). Mahwah, NJ: Erlbaum.

Glynn, S. M., Aultman, L. P. and Owens, A. M. (2005). Motivation to learn in general education programns. *The Journal of General Education, 54*(2), 150-170.

Griffin, J. (2004). Research on students and museums: looking more closely at the students in school groups, Science Education, 88, (1), 59-70.

Haladyna, T. M. (1997). *Writing test items to evaluate higher order thinking*. USA: Allyn and Bacon.

Halliday, M.A.K. (1994). *An introduction to functional grammar* (2nd ed.). London: Edward Arnold.

Hawkins, D. (1965). Messing about in science. *Science and Children, 2*(5), 5-9.

Hein, G. E. (1998). *Learning in the museum.* London, Routledge.

Hellden, G. & Hellden, S. (2008). Students' early experiences of biodiversity and education for a sustainable future. *Nordic Studies in Science Education, 4* (2), 123-131.

Hewson, P. W. & Thorley, N. R. (1989). The conditions of conceptual change in the classroom. *International Joumal of Science Educatioll, 11*, 541-553.

Hidi, S., & Harackiewicz, J. M. (2000). Motivating the Academically Unmotivated: A Critical Issue for the 21st Century. *Review of Educational Research, 70*(2), 151- 179.

Hodder, A. P. W. (1997). Science-technology centers in science education in new Zealand. In B. Bell and R. Baker, (Eds.). *Developing hte science curriculum in AOTEAROA, New Zealand* (141-155). Sydney, Australia: Longman.

Huang, S. L., & Waxman, H. C. (1995). Motivation and learning environment differences between Asian American and white middle school students in mathematics. *Journal of Research and Development in Education, 28*, 208-219.

Hutt, C. (1971). Exploration and play in children. In Herron, R. E. and Sutton-Smith, B. (Eds.) *Child's Play*, London: Willey.

Jarvis, T. & Pell, A. (2005). The relationships between primary teachers' attitudes and cognition during a two year science in-service programme. In K. Boersma, M. Goedhart, O. de Jong & H. Eijkelhof (eds) *Research and The Quality of Science Education*, (157-168), Springer.

Joanne, A. D. (1998). Animal activity and visitor learning at the zoo. Anthrozoos: A Mutlidisciplinary *Journal of The Interactions of People and Animals, 11*(1), 12-21.

Johnston, D. & Rennie, L. (1995). Perceptions of visitors' learning at an interactive science and technology center in Australia. *Museum management and curatorship, 14*, 317-325.

Kadıoğlu, C. & Uzuntiryaki, E. (2008). Motivational factors contributing to Turkish high school students' achievement ain gases and chemical reactions. *American Educational Research Association,* 24-28.

Kassas, M. (2002). Environmental education: biodiversity. *The Environmentalist, 22*, 345-351.

Kellert, S. R. (1996). *The value of life, biological diversity and human society*, Island Press, Shearwater Book.

Keys, C. W., Hand, B., Prain, V. & Collins, S. (1999). Using the Science Writing Heuristic As A Tool For Learning From Laboratory Investigations In Secondary Science, *Journal of Research in Science Teaching, 36*, 1055-1084.

Kıyıcı, B. & Yiğit, E. A. (2010). Science Education beyond the Classroom: A Field Trip to Wind Power Plant, *International Online Journal of Educational Sciences*, *2*(1), 225-243

Kim, B. (2001). Social constructivism. In M. Orey (Ed.), Emerging perspectives on learning, teaching, and technology. Retrieved from: http://www.coe.uga.edu/epltt/SocialConstructivism.htm

Kisiel, J. (2005). Understanding elementary teacher motivations for science field trips. *Science Education, 89*(6), 936-955.

Koballa, T. R., & Glynn, S. M. (2007). Attitudinal and motivational constructs in science learning. In: S. Abell, and N. Lederman (Eds.) *Handbook of Research on Science Education* (75-102). Mahwah, New Jersey: LEA Publishers.

Koran, J.J., Koran, M.L., & Ellis, J. (1989). Evaluating the effectiveness of field experiences: 1939-1989. *Visitor Behavior, 4*, 7-10.

Krajcik, J. S. & Sutherland, M. L. (2010). Supporting students in developing literacy in science, *Science, 328*(5977), 456-459.

Krapp, A. (2002). Structural and dynamic aspects of interest development: theoretical considerations from an ontogenetic perspective. *Learning and Instruction*, *12*(4), 383.

Kukla, A. (2000). *Social Constructivism and the Philosophy of Science*. New York: Routledge.

Lave, J. & Wagner, E. (1991). *Situated Learning: Legitimate Peripheral Participation.* Cambridge, England: Cambridge University Press.

Lawson, A. E. (1983). Predicting science achivement: the role of developmental level, disembedding ability, mental capacity, prior knowledge and belifs. *Journal of Research in Science Teaching*, *20*(2), 117-129

Leach, J. & Scott, P. (2002). Designing and Evaluating science teaching sequences: and approach drawing upon the concept of learning demand and social constructivist perspective. *Studies in Science Education, 38*, 115 - 142.

Leinhardt, G., Tittle, C., & Knutson, K. (2002). Talking to oneself: Diaries of museums visits. In G. Leinhardt, K. Crowley, and K. Knutson (Eds.), *Learning conversations in museums* (103–134). Mahwah, NJ: Lawrence Erlbaum.

Lemke, J. L. (1983). Classroom Communication of Science. Final Report to the U.S. National Science Foundation. Arlington, VA. (ERIC Document Reproduction Service No. ED 222 346).

Lemke, J. L. (1990). *Talking science: Language, learning, and values.* Norwood, NJ: Ablex.

Lemke, J. L. (2001). Articulating Communities: Socio-cultural Perspectives on Science Education, *Journal of Research in Science Teaching*, *38*(3), 296 - 316 (2001)

Lepper, M. R., Corpus, J. H., & Iyengar, S. S. (2005). Intrinsic and Extrinsic Motivational Orientations in the Classroom: Age Differences and Academic Correlates. *Journal of Educational Psychology, 97* (2), 184-196.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications, Inc.

Luke, J., Coles, U., & Falk, J. (1998). Summative evaluation of DNA zone, St. Louis Science Center. Unpublished evaluation report. Annapolis, MD: Institute for Learning Innovation.

Lumsden, L. S. (1994). Student motivation to learn, *ERIC Digest, 92*, 1-7.

Maehr, M. L. (1976). Continuing motivation: An analysis of a seldom considered educational outcome. *Review of Educational Research, 46*(3), 443-462.

Magntorn, O. & Helldén, G. (2007) Reading new environments: Students' ability to generalize their understanding between different ecosystems. International *Journal of Science Education, 29* (1), 67-100.

Mann, D. (1996).Serious play. *Teachers College Record, 97*, 446-469.

Matusov, E. & Rogoff, B. (1995). Evidence of development from people's participation in communities of learners. In J. H. Falk and L. D. Dierking (Eds.), *Public institutions for personal learning: Establishing a research agenda* (97-104). Washington DC: American Association of Museums.

Mayr, E. (1982). *The growth of biological thought, The* Belknap Press of Harvard University Press Cambridge, Massachusetts London, England.

McManus, P. M. (1992). Topics in museums and science education. *Studies in Science Education*. *20*, 157-187.

Medved, M.I. & Oatley, K. (2000). Memory and science literacy: Remembering exhibits from a science center. *International Journal of Science Education, 22*, 1117-1132.

Melber, L.M. (2008). *Informal learning and field trips: engaging students in standards-based experiences across the K-5 curriculum.* Thousand Oaks, CA: Corwin Press.

Metlzoff, A. N. (2007). Infants' causal lerning: inteverntion, obsrvation, imitation. In A. Gopnik and L. Schulz (Ed.) *Causal Learning: Psychology, philosophy and computation.* New York, NY, US: Oxford University Press.

Michalski, R. S. & Stepp, R. E. Learning from observation: Conceptual Cluturing, *Machine Lerning Symbolic Computation*, 331-363.

Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis: an expended sourcebook*. 2nd edition. California CA: Sage Publications.

Mortensen, M. F. & Smart, K. (2007). Free choice worksheets increase students' exposure to curriculum during museum visits, *Journal of Research in Science Teaching*, *44*(9), 1389-1414.

Nundy, S. (1999). 'The fieldwork effect: the role and impact of fieldwork in the upper primary school', *International Research in Geographical and Environmental Education, 8*(2), 190–8.

Onwuegbuzie, A. J., & Leech, N. L. (2007). A call for qualitative power analyses: Quality and Quantity. *International Journal of Methodology, 41*, 105-121.

Orion, N. (1993). A model for the development and implementation of field trips as an integral part of the science curriculum. *School Science and Mathematics, 93*, 325-331.

Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: a review of the literature and its implications. *International Journal of Science Education, 25*(9), 1049-1079.

Packer, J. & Ballantyne, R. (2002). Motivational factors and the visitor experience: A comparison of three sites. *The Museum Journal, 45*(3), 183-198.

Paris, S. G., Yambor, K. M., & Packard, B. (1998). Hands-on Biology: A museum-school-university partnership for enhancing students' interest and learning in science. *The elementary School Journal, 98*, 267-289.

Pascarella, E. T., Walberg, H. J., Junker, L. K., & Haertel, G. D. (1981). Continuing motivation in science for early and late adolescents. *American Educational Research Journal, 18*(4), 439-452.

Patrick, P. G. & Tunnicliffe, S. D. (2013). *Zoo Talk*. Dordrecht : Springer Netherlands : Imprint: Springer, 2013.

Perry, D. L. (1992). Designing exhibits that motivate, *ASTC Newsletter*, March/April: 9-12.

Posner, G. J., Strike, K. A., Hewson, P. W., & Gertzog, W. A. (1982). Accommodation of a scientific conception: Toward a theory of conceptual change. *Science Education, 66*, 211-227.

Prawat, R. S., & Floden, R. E. (1994). Philosophical Perspectives on Constructivist Views of Learning. *Educational Psychologist, 29*(1), 37-48.

Reece, J. B., Urry, L. A., Cain, L. M. & Wasserman, S. A. (2010). *Campbell Biology* 9th Edition, Pearson Rentice Hall.

Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist, 44*(3), 159-175.

Rennie, L. J. & McClafferty, T. P. (1996). Science centers and science learning. *Studies in Science Education*, 27, 53-98.

Rennie, L. J. (2007). "Learning science Outside of School." In S. K. Abell and N. G. Lederman, *Handbook of Research on Science Education*, (125-167). Mahwah, NJ: Lawrence Erlbaum Associates.

Resnick, L., Levine, J., & Teasley, S. (Eds.). (1991). *Perspectives on socially shared cognition.* Washington, DC: American Psychological Association.

Roth, W. M. (1999). Discourse and agency in school science laboratories. *Discourse Processes, 28*, 27-60.

Ryan, R. M. & Deci, E. L. (2000) Intrinsic and extrinsic motvations: classic definitions and new directions, *Contemporary Educational Psychology*, *25*(1), 54-67.

Schauble, L., Leinhardt, G., & Martin, L. (1997). A Framework for Organising a Cumulative Research Agenda in Informal Learning Contexts. *Journal of Museum Education, 22*, 3-8.

Schunk, D. H. (2000). Motivation for achievement: Past, present, and future. *Issues in Education: Contributions from Educational Psychology, 6*, 161-165.

Schunk, D. H., Meece, J. L. and Pintrinch, P. R. (2014). *Motivation in Education: Theory, Reserach and Applications.* 4th edition. Pearson.

Semper, R. J. (1990). Science museums as environments for learning. *Physics Today, November 1990,* 50-56.

Serrel, B. (1990). *What research says about learning in science museums* (pp. ii, 30). Washington, DC: Association of Science-Technology Centers.

Sherwood Jr., K. P., Rallis, S. F. & Stone, J.(1989). Effects of live animals vs. preserved specimens on student learning. *Zoo Biology, 8*(1), 99-104

Slingsby, D. (2011). Nurturing the Ecologists of Tomorrow: Why It Is Important to Re-Think Ecology in the High School Curriculum. *Bulletin of the Ecological Society of America, 92,* 206–213.

Smith, G.T.; Fischer, S. & Fister, S. M. (2003) Incremental Validity Principles in Test Construction. *Psychological Assessment, 15*(4), 467-477. doi: 10.1037/1040-3590.15.4.467

Sorensen, R. L., & Maehr, M. L. (1976). Toward the experimental analysis of continuing motivation. *Journal of Educational Research, 69*(9), 319-322.

Stake, J., & Mares, K. R. (2001). Science enrichment programs for gifted high school girls and boys: Predictors of program impact on science confidence and motivation. *Journal of Research in Science Teaching, 38*(10), 1065-1088.

Stevenson, J. (1991). The long-ternm impact of interactive exhibits. *International Journal of Science Education. 13*, 521-531.

Sylva, K., Bruner, J. S. & Genova, P. (1976). The role of play in the problem-solving of children 3-5 years old, In J. S. Bruner, A. Jolley, and K. Sylva.

(Eds.) *Play: Its Role in Development and Evolution*. Harmonsworth: Penguin.

Tal, T. (2012). Out-of-School: Learning experiences, teaching and students' learning. In: K. Tobin & B. J. Fraser & C.J. McRobbie (eds.). *Second International Handbook of Science Education* (1109-1122). Springer.

Tasdemir, A., Kartal, T., & Ozdemir, A. M. (2014). Using science centers and museums for teacher training in Turkey. *Asia-Pacific Educational Research, 23*(1), 61-72.

Telli, S., Cakiroglu, J., & Brok, P. (2006). Turkish secondary education students' perceptions of their classroom learning environment and their attitude towards Biology. In D. L. Fisher and M. S. Khine (Eds.), *Contemporary approaches to research on learning environments: world views* (517-542). Singapore: World Scientific.

Tkach, D. , Reimer J., & Hatsopoulus, N. G. (2008). Observation-based lerning for brain-machine interfaces, *Current Opinion in Neurobiology*. *18*(6), 589-594.

Tofield, S., Coll, R.K., Vyle, B., & Bolstad, R. (2003). Zoos as a source of free choice learning. *Research in Science and Technological Education, 21*, 67-99.

Toprac, P. (2008). The effects of a problem base learning digital game on continuing motivation to learn science (Doctoral Dissertation). Retrieved from ProQuest Dissertations and Theses. (Accession Order No. AAT 3329870).

Tuan, H., Chin, C., & Shieh, S. (2005). The Development of a Questionnaire to Measure Students' Motivation Towards Science Learning. Research Report. *International Journal of Science Education, 27*(6), 639-654.

Tunnicliffe, V. (1996). Paleobiology: an alternative viewpoint. *Journal Geological Education, 44*, 1-3.

Tunnicliffe, S. D., Lucas, A. M. & Osbourne, J. (1997). School visits to zoos and museums: a missed educational opportunity?, *International Journal of Science Education, 19*(9), 1039-1056.

Tytler, R. (2002). Teaching For Understanding In Science: onstructivist/Conceptual Change Teaching Approaches, *Australian Science Teachers Journal, 48* (4), 30-35.

Vallerand, R. J., & Bissonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: A prospective study. *Journal of Personality. 60*(3), 599-620.

Vallerand, R.J., Pelletier, L.G., Blais, M.R., Brie`re, N.M., Se´ne´cal, C., & Vallie`res, E.F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement, 52*, 1003–1017.

Vallerand, R.J., Pelletier, L.G., Blais, M.R., Brie`re, N.M., Se´ne´cal, C., and Vallie`re, E.F. (1993). On the assessment of intrinsic, extrinsic, and motivation in education: Further evidence in concurrent and construct validity of the Academic Motivation Scale. *Educational and Psychological Measurement*, 35, 159 –172.

Vallerand, R.J., Blais, M.R., Brie`re, N.M., & Pelletier, L.G.(1989). Construction et validation de l'E´ chelle de motivation en e´ducation (E´ME´) [Construction and validation of the Academic Motivation Scale (AMS)]. *Revue Canadienne des Sciences du Comportement, 21*, 323–349.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. President and Fellows of Harward Collage.

Walton, R. (2000). Heidegger in the hands-on science and technology center: Philosophical reflections on learning in informal settin. *Journal of Technology Education, 12,* 49-60.

Wellington, J. J. (1998) *Practical Work in School Science: which way now?* , London: Routledge.

Wells, G. (1986). *The Meaning Makers: Children learning language and using language to learn.* Portsmouth, NH: Heinemann Educational. 2.1 Socio-cultural Theory.

Whitehead, M. (1995). Saying it with genes, species and habitats: biodiversity education and the role of zoos, *Biodiversity and Conservation, 4,* 664-670.

Yumusak, N., Sungur, S. & Cakiroglu, J. (2007) Turkish high school students' achivement on animal diversity unit in relation to academic self-regulation, *Educational Research and Evaluation, 13*(1), 53 — 69.

Zusho, A., Pintrich, P. R., & Coppola, B. (2003). Skill and will: The role of motivation and cognition in the learning of college chemistry. *International Journal of Science Education, 25,* 1081-1094.

APPENDIX A

CONTINUING MOTIVATON SURVEY TO LEARN BIOLOGY

İsim:

Son iki hafta içinde, **biyoloji dersi için gerekmediği halde**, aşağıda listelenmiş aktiviteleri ne sıklıkla yaptınız?
Lütfen size uyan sıklık derecesini daire içine alınız.

		Sık Sık	Bazen	Nadiren	Hiçbir zaman
1	Gazeteler, dergi veya internetteki biyoloji ile ilgili yazıları okudum.	4	3	2	1
2	Biyoloji ile ilgili bir hobi üstünde çalıştım.	4	3	2	1
3	Biyoloji ile ilgili konferansları dinlemeye gittim.	4	3	2	1
4	Bilim dergileri okudum.	4	3	2	1
5	Biyoloji ile ilgili belgeseller seyrettim.	4	3	2	1
6	Biyoloji ile ilgili kitaplar okudum.	4	3	2	1
7	Arkadaşlarımla biyoloji ile ilgili konular konuştum.	4	3	2	1
8	Biyoloji ile ilgili bir proje yaptım.	4	3	2	1

APPENDIX B

ACADEMIC MOTIVATION SURVEY

Kesinlikle katılmıyorum	Katılmıyorum	Az da olsa katılmıyorum	Kararsızım	Az da olsa katılıyorum	Katılıyorum	Kesinlikle katılıyorum
1	2	3	4	5	6	7

Her bir ifade için sizin için en uygun olan rakamı işaretleyiniz.		**Kesinlikle katılmıyorum**						**Kesinlikle katılıyorum**
1.	Yeni şeyler öğrenirken keyif alıyor ve tatmin olduğum için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
2.	Daha önce görmediğim şeyleri keşfettiğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
3.	İlgimi çeken konular ile ilgili bilgi dağarcığımı genişletirken keyif aldığım için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
4.	İlgimi çeken konularda yeni bir çok şey öğrenmemi sağladığı için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
5.	Derslerimde ilerlediğimi gördüğümde keyif aldığım için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
6.	Kişisel bir başarıya imza attığımı kendime göstermek istediğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
7.	Biyoloji dersindeki zor aktivitelerde başarılı olduğumda hissettiğim tatmin duygusunu yaşadığım için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
8.	Biyoloji dersinin diğer derslerimde mükemmel olma yolunda yardımcı olduğunu düşündüğüm için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7

9.	Biyoloji ile ilgili fikirlerimi başkalarıyla paylaşırken yaşadığım duyguları sevdiğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
	Her bir ifade için sizin için en uygun olan rakamı işaretleyiniz.	**Kesinlikle katılmıyorum**						**Kesinlikle katılıyorum**
10.	Biyoloji ile ilgili ilginç yazarları okurken keyif aldığım için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
11.	Bazı yazarların biyoloji ile ilgili yazdıklarını tamamen anladığımda keyif aldığım için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
12.	Biyoloji ile ilgili ilgimi çeken konular hakkında bir şeyler okurken keyif aldığım için biyoloji dersini çalışıyorum	1	2	3	4	5	6	7
13.	Biyoloji dersi sayesinde ulaşacağım üniversite eğitimi seçtiğim kariyere daha iyi hazırlanmamı sağlayacağı için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
14.	Biyoloji dersi sayesinde ulaşacağım üniversite eğitimi sevdiğim bir sektörde iş bulmamı sağlayacağı için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
15.	Bir kaç yıl daha eğitim görürsem daha iyi bir çalışan olabileceğimi düşündüğüm için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
16.	Biyoloji dersi sayesinde ulaşacağım üniversite eğitimi kariyer seçimi konusunda daha iyi bir tercih yapmamı sağlayacağı için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
17.	Lise diploması alabileceğimi kendime kanıtlamak istediğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
18.	Lisede başarılı olursam kendimi önemli hissedeceğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
19.	Kendime zeki biri olduğumu göstermek istediğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
20.	Kendime derslerimde başarılı olabileceğimi göstermek istediğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
21.	Lise diplomam olmadan iyi bir iş bulamayacağım için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7

22.	Daha saygın bir iş bulmak istediğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
23.	İyi bir hayatım olsun istediğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
Her bir ifade için sizin için en uygun olan rakamı işaretleyiniz.		**Kesinlikle katılmıyorum**						**Kesinlikle katılıyorum**
24.	Daha yüksek bir maaşla çalışabilmek istediğim için biyoloji dersini çalışıyorum.	1	2	3	4	5	6	7
25.	Dürüst olmak gerekirse neden biyoloji dersi aldığımı bilmiyorum. Biyoloji dersleriyle vaktimi boşa harcadığımı hissediyorum.	1	2	3	4	5	6	7
26.	Bu dersi çalışmak için bir zamanlar iyi sebeplerim vardı ama artık yok.	1	2	3	4	5	6	7
27.	Neden biyoloji gördüğümü bilmiyorum.	1	2	3	4	5	6	7
28.	Neden biyoloji dersi aldığımı bilmiyorum, bu derslerde ne yaptığımı anlamıyorum.	1	2	3	4	5	6	7

APPENDIX C

OBJECTIVES

1. Canlıların sınıflandırılması ile ilgili olarak öğrenciler; yakın çevresindeki gözlemlerinden yararlanarak canlıların çeşitliliğini fark eder.

2. Canlıları bilimsel sınıflandırmanın önemini açıklar.

3. Organizmaların ikili adlandırılmasının (binomial) gerekliliğini örneklerle açıklar.

4. Canlıları sınıflandırma kriterlerini belirtir.

5. Canlıları sınıflandırmada kullanılan başlıca kategorileri inceleyerek bu kategorilerin belirli bir hiyerarşiyi yansıttığını fark eder.

6. Sınıflandırmadaki âlemler ve özellikleri ile ilgili olarak öğrenciler; canlıların; arkebakteriler, bakteriler, protistalar, mantarlar, bitkiler ve hayvanlar olarak 6 âlem altında sınıflandırıldığını belirtir.

7. Basit bir teşhis anahtarını kullanarak verilen organizmaları teşhis eder.

8. Arkebakteriler âleminin genel özelliklerini belirterek örnekler verir.

9. Bakteriler âleminin genel özelliklerini belirterek örnekler verir.

10. Protista âleminin genel özelliklerini belirterek örnekler verir.

11. Mantarlar âleminin genel özelliklerini belirterek örnekler verir.

12. Bitkiler âleminin başlıca alt gruplarının genel özelliklerini belirterek örnekler verir.

13. Hayvanlar âleminin başlıca alt gruplarının genel özelliklerini belirterek örnekler verir.

14. Biyolojik çeşitlilik ve türlerin korunması ile ilgili olarak öğrenciler: biyolojik çeşitliliğin önemini açıklar.

15. Türkiye'nin biyolojik çeşitlilik açısından zengin olmasının nedenlerini irdeler.

16. Türkiye'deki biyolojik çeşitliliğin ve endemik türlerin korunmasına yönelik bireysel ve işbirliğine dayalı öneriler geliştirir.

APPENDIX D

ANIMAL DIVERSITY ACHIEVEMENT TEST

İsim:

Doğru / Yanlış
Aşağıda yer alan ifadeleri okuyunuz ve doğru cümlelerin sonundaki boşluğa "D", yanlış cümlelerin sonundaki boşluğa (Y) yazınız.

	1. Sınıflandırma basamaklarında "tür"den "âlem"e doğru basamaklarda bulunan birey sayısında ve çeşidinde azalma olur.
	2. İki canlı karşılaştırıldığında aralarında homolog yapılar çoksa bu iki canlı birbiriyle uzak akrabadır.
	3. Hayvan türlerinin çoğunluğu omurgasız olarak sınıflandırılır.
	4. Bütün hayvanlar heterotroftur.
	5. Bilim insanları arasındaki yanlış anlamaları engellemek için biyologlar her canlıya iki kelimeden oluşan özel bir isim vermişlerdir.

Çoktan Seçmeli

Aşağıdaki ifadeleri en iyi tamamlayan veya sorulan soruya en doğru cevabı veren şıkkı işaretleyin.

1. Evcil köpek ve ev kedisi hem etçil hem de otçul olarak beslenen iki farklı türdür.
Bu türler , aşağıdaki sınıflandırma birimlerinden hangisinde ortak kullanılmıştır?
A) Alem

B) Şube
C) Sınıf
D) Familya
E) Takım

2. Canlıların sınıflandırılmasıyla ilgili;''Protista ile Paramesyum'' arasındaki ilişki aşağıdakilerden hangisi arasında yoktur?
A) Arkeler / Halofiller
B) Protista /Öglena
C) Fungi / Bira mayası
D) Bitkiler / Mavi-yeşil alg
E) Hayvanlar / Hidra

3. Alem'den türe doğru olan sınıflandırma birimleri sırasıyla şu şekildedir:
A) Alem, sınıf, familya, takım, şube, cins, tür
B) Alem, şube, takım, familya,, sınıf, cins, tür.
C) Alem, şube, sınıf, takım, familya cins, tür.
D) Alem, sınıf, takım, şube, familya,, cins tür.
E) Alem, takım, sınıf, şube, familya, cins, tür.

4. Hayvanlarla ilgili;
I.İç iskelet
II. Kapalı dolaşım
III. Bilateral Simetri
IV.Yavruları sütle beslemek
Özelliklerinden hangileri bütün omurgalı gruplarında bulunur?
A) Yalnız II
B) I ve IV
C) I ,II ve III
D) Yalnız I
E) Yalnız IV

5. Aşağıdaki memeli gruplarından hangisi diğerlerinden daha fazla tür bulundurur?
A) Gagalı memeliler
B) Plasentalı memeliler
C) Geviş getiren memeliler
D) Keseli memeliler
E) Yüzen memeliler

6. Bir ev kedisinin sınıflandırılmasında;
I. Omurga bulundurma
II. Kas hareketi yapma ve heterotrof beslenme
III. Süt salgılama gibi özellikler kullanılır.
Bu özelliklerin âlemden türe doğru yapılan sınıflandırmada kullanım sırası aşağıdakilerin hangisinde doğru verilmiştir?
A) I-II-III
B) II-1 -III
C) II - III -1
D) III - I - II
E) I - III – II

7. Belirli bir hayvan grubunun özellikleri şunlardır:
- **Çoğu karada yaşamaktadır.**
- **Trake solunumu yapmaktadırlar.**
- **Vücutları; baş, göğüs ve karın olmak üzere 3 parçadan oluşmuştur.**
- **Başlarında bir çift bileşik göz ve 1 çift anten vardır.**

Bunların birlikte bulunduğu <u>en küçük</u> sınıflandırma birimi aşağıdakilerden hangisidir?
A) Âlem
B) Şube
C) Sınıf
D) Tür
E) Cins

8. Aşağıda üç ayrı türün, tür adları verilmiştir:
Canis lupus, Canis familiaris, Canis latran
Bu üç tür, sistematiğin hangi biriminden itibaren birlikte yer alırlar?
A) Tür
B) Cins
C) Familya
D) Sınıf
E) Takım

9. I. Açık dolaşım sistemine sahip olma
II. İç iskelete sahip olma
III. Yavrularını süt ile besleme
Yukarıda verilen özelliklerden hangileri tüm <u>omurgalılar</u> için ortaktır?
A) Yalnız I
B) Yalnız II

C) Yalnız III
D) I ve III
E) II ve III

10. Aşağıdaki özelliklerden hangisi yalnızca memelilere özgüdür?
A) Karın boşluğu ile göğüs boşluğunu birbirinden ayıran kaslı diyafram yapısının olması
B) Vücut sıcaklığının sabit olması
C) Kalbin dört odacıklı olması
D) Solunum pigmenti olarak hemoglobin bulundurmaları
E) Aşamalı sindirim yapabilmeler

Kısa Cevap
Aşağıda verilmiş tabloda, numaralandırılmış kutucuklarda çeşitli canlı isimleri verilmiştir. Kutucuk numaralarını kullanarak aşağıdaki soruları yanıtlayınız.(Kazanım: 2.8)

1 Fil	2 Toprak solucanı	3 Kaplumbağa	4 Yengeç
5 Akbaba	6 Köpek Balığı	7 Midye	8 Ergin kurbağa

1. Yukarıdaki canlılardan hangileri omurgasızdır? ……..
2. Yukarıdaki canlılardan hangisi yumuşakçadır? ……..
3. Yukarıdaki canlılardan hangisi eklembacaklıdır? ……..
4. Yukarıdaki omurgalılardan hangileri soğukkanlıdır? ……..
5. Yukarıdaki canlılardan hangisinde iç döllenme görülür? ……..

APPENDIX E

PRE-VISIT ANIMAL DIVERSITY ACTIVITY LESSON PLAN

Giriş:
Canlıların sınıflandırılması ile ilgili olarak günlük hayatta gözlemler yapmak ve bu gözlemlere dayanarak sınıflandırma ile ilgili çalışmalarda bulunmak son derece önemlidir.Bu ders, Linnaeus'nin Sınıflandırma Sistemi'ni kullanarak hayvanların sınıflandırılmasıyla ilgili bir tablo doldurmak için dizayn edilmiştir.

Kazanımlar:
Bu dersin sonunda öğrenciler:
1. Hayvanlar Alemi'ne ait şube ve sınıfları listeler.
2. Her şubenin ve sınıfın ayıredici özelliklerini listeler.
3. Her şubeye ve sınıfa air hayvanlardan örnekler verir.

Milli Eğitim Bakanlığı 9. Sınıf Biyoloji Dersi Müfredatı'nda belirtilen 2. Ünite kazanımları:
1.1 Canlıların sınıflandırılması ile ilgili olarak yakın çevresindeki gözlemlere dayanarak canlıların çeşitliliğini farkeder.
1.4 Sınıflandırma kriterlerini belirtir.
1.5 Kullanılan kriterlerin belirli bir hiyerarşiyi yansıttığını farkeder.
2.2 teşhis anahtarı kullanarak yakın çevredeki organizmayı teşhis eder.
2.8 Hayvanlar aleminin genel özelliklerini belirtir ve örnekler verir.

Prosedür:
1. Öğretmen ders için sınıflandırma tablosunu, önceden bazı şube ve sınıf isimleri ile doldurulmuş şekilde, ve sınıflandırma basamalı tablosunu çoğaltır ve öğrencilere dağıtır.
2. Bu aktivite, sınıflandırma sistemi ve hayvanlar alemine ait şube ve sınıf listesi öğrencilere anlatıldıktan sonra uygulanacaktır. Öğrenciler sınıflandırma tablosunu kullanarak şube ve sınıf özelliklerini özetler. Hayvanat Bahçesi gezisi sırasında öğrenciler bu tabloyu kullanacaklardır.

3. Öğrenciler gruplara ayrılır ve her gruba bir şube ödev olarak verilir. Öğrenciler 5 dakika boyunca o şube ile ilgili toplayabildikleri bilgiyi ellrindeki tabloya girerler.
4. 5 dakikalık grup çalışması sonunda öğrenciler topladıkları bilgileri sınıfa rapor ederler. Öğrenciler, ellerindeki tabloyu rapor edilen bilgiler ışığında doldurarak bütün şubeleri tamamlar. Öğrencilerin bulduğu bilgilerdeki her hangi bir eksikik olursa öğretmen bu eksikliği giderir.

APPENDIX F

ANIMAL DIVERSITY PRE-VISIT ACTIVITY WORKSHEET

(Memeliler) Alem/Şube/ Sınıf: Özellikler: Örnekler:	
(Sürüngenler) Alem/Şube/ Sınıf: Özellikler: Örnekler:	
(Kuşlar) Alem/Şube/ Sınıf: Özellikler: Örnekler:	
(Amfibiler) Alem/Şube/ Sınıf: Özellikler: Örnekler:	
(Balıklar) Alem/Şube/ Sınıf: Özellikler: Örnekler:	

APPENDIX G

ANIMAL DIVERSTY PRE-VISIT ACTIVITY WORKSHEET ANSWER KEY

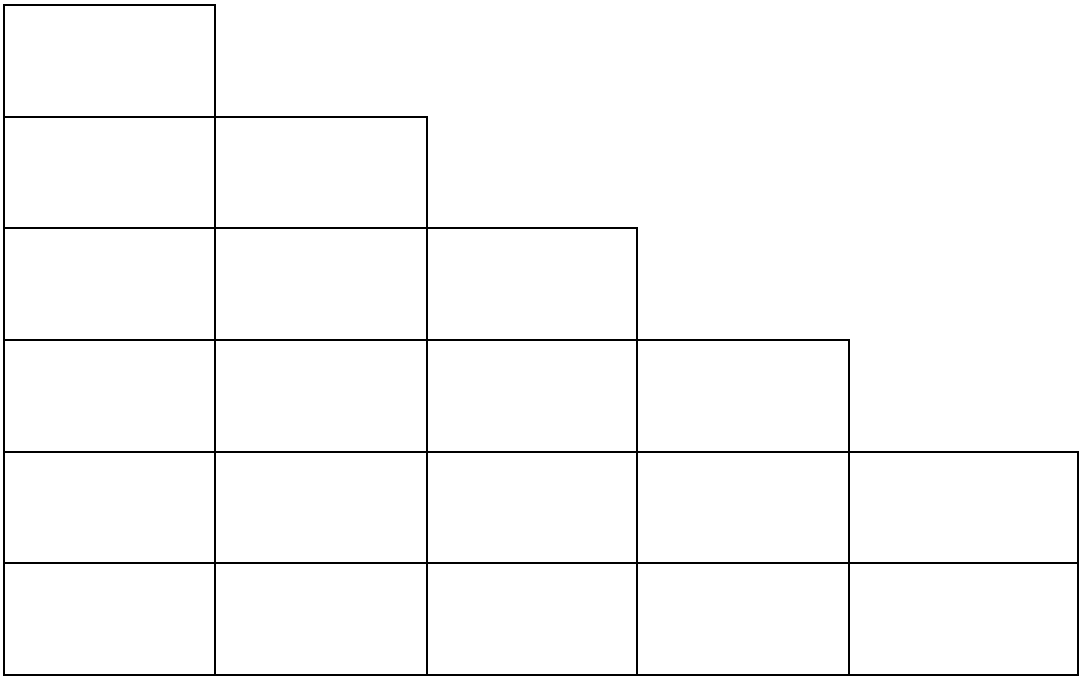
Domain: Ökarya	
Alem/Şube/ Sınıf:	Animalia/Chordata/Vertebrata/Mammalia (Memeliler)
Özellikler:	4 odacıklı kalpleri olan sıcakkanlı hayvanlardır. Derileri kıllarla örtülüdür. Anneler yavrularını doğurur ve sütle beslerler.
Örnekler:	Zebralar, zürafalar, kurtlar,filler, yunuslar, balinalar, vs.
Alem/Şube/ Sınıf:	Animalia/Chordata/Vertebrata/Reptilia (Sürüngenler)
Özellikler:	Pullu derileri ve akciğerleri olan soğukkanlı hayvanlardır. Yumurtalarını karaya bırakırlar.
Örnekler:	Kaplumbağa, yılan, timsah, vs.
Alem/Şube/ Sınıf:	Animalia/Chordata/Vertebrata/Aves (Kuşlar)
Özellikler:	Dört odacıklı kalpleri ve tüyleri olan sıcakkanlı hayvanlardır. Yuvaya yumurtlarlar.
Örnekler:	Devekuşu, akbaba, kartal, puhu kuşu, baykuş, vs.
Alem/Şube/ Sınıf:	Animalia/Chordata/Vertebrata/Amphibia (Amfibiler)
Özellikler:	Hayatının neredeyse tümünü suda geçiren soğukkanlı hayvanlardır. Yetişkinler karada yaşar

Örnekler:	ama yumurtlamak için suya dönerler. Larvaları başkalaşım geçirir. Kurbağalar, semenderler, vs.
Alem/Şube/ Sınıf: Özellikler: Örnekler:	Animalia/Chordata/Vertebrata/Osteichthyes (Balıklar) Yüzgeçleri ve pullu derileri olan, suda yaşayan soğukkanlı hayvanlardır. Sudaki oksijeni solungaçları yardımıyla vücutlarına alırlar. Melek balığı, palyaço balığı, vs.

APPENDIX H

ANIMAL DIVERSITY GRID

Her kategoriye uyan hayvanları bulup genel isimleriyle birlikte tür isimlerini kutucuklara yazın.



Domain:Eukarya Alem:Animalia Takım:Chordata Alt- Takım:Verbrata Sınıf: Mammalia (Memeliler)	Domain:Eukarya Alem:Animalia Takım:Chordata Alt- Takım:Verbrata Sınıf: Osteichthyes (Balıklar)	Domain:Eukarya Alem:Animalia Takım:Chordata Alt- Takım:Verbrata Sınıf: Reptilia (Sürüngenler)	Domain:Eukarya Alem:Animalia Takım:Chordata Alt- Takım:Verbrata Sınıf: Aves (Kuşlar)	Domain:Eukarya Alem:Animalia Takım:Chordata Alt- Takım:Verbrata Sınıf: Amphibians (Amfibiler)

APPENDIX I

POST-VISIT ACTIVITY LESSON PLAN

Giriş:
Canlıların sınıflandırılması ile ilgili olarak günlük hayatta gözlemler yapmak ve bu gözlemlere dayanarak sınıflandırma ile ilgili çalışmalarda bulunmak son derece önemlidir. Bu ders, hayvanat bahçesine yapılan bir gezi sonrası öğrencilerin gezi ile ilgili bir tartışma ortamında bulunması için dizayn edilmiştir. Buna ek olarak hayvanat bahçesinde gördükleri türlerin dünyadaki canlı çeşitliliğini yansıtıp yansıtmadığı öğrenciler tarafından değerlendirilecektir.

Kazanımlar:
Bu dersin sonunda öğrenciler:

1. Hayvanat bahçesindeki hayvanları şube ve/veya sınıflarına gore teşhis eder.
2. Bazı şubeleri yaşadıkları ortamlarıyla ilişkilendirir.
3. Hayvanat bahçesindeki hayvanların çeşitliliği ile dünyadaki hayvan çeşitliliği arasındaki ilişkiyi farkeder.

Milli Eğitim Bakanlığı 9. Sınıf Biyoloji Dersi Müfredatı'nda belirtilen 2. Ünite kazanımları:
1.1 Canlıların sınıflandırılması ile ilgili olarak yakın çevresindeki gözlemlere dayanarak canlıların çeşitliliğini farkeder.
1.4 Sınıflandırma kriterlerini belirtir.
1.5 Kullanılan kriterlerin belirli bir hiyerarşiyi yansıttığını farkeder.
2.2 teşhis anahtarı kullanarak yakın çevredeki organizmayı teşhis eder.
2.8 Hayvanlar aleminin genel özelliklerini belirtir ve örnekler verir.

Prosedür:

1. Öğrenciler hayvanat bahçesinde topladıkları bilgileri sınıf içinde birbirleriyle paylaşırlar.
2. Konu ile ilgili bir tartışma başlatmak için öğretmen öğrencilere hayvan çeşitliliği ile ilgili bir liste sunar. Öğretmen tahtaya hayvan şubelerini /

sınıflarını yazar. Öğrenciler hayvanat bahçesinde gördükleri hayvanları bu listed uygun olan yerlere yazmak için sınıfla paylaşırlar.

3. Öğrenciler oluşturdukları tabloya ve hayvanat bahçesinde yaptıkları gözlemlere dayanarak şu sorulara cevap verirler:
    a. Dünyada en çok bulunan şubeye ait hayvanlar hayvanat bahçesinde bulunuyor muydu?
    b. Belli bölgeler (Akvaryum, savana, vs.) belli hayvan şubelerini daha mı çok barındırıyordu?

APPENDIX K

INTERVIEW QUESTIONS

SÜREGELEN İLGİ MÜLAKAT SORULARI

GİRİŞ, BİLGİLENDİRME VE ÖN SORULAR

- Bu mülakata katılımınızdan dolayı öncelikle teşekkür ederim.
- Bu mülakat Orta Doğu Teknik Üniversitesi bünyesinde yaptığım doktora tez çalışmamın bir parçasını oluşturmaktadır.
- Bazı insanlar biyoloji öğrenmekten hoşlanırken bazıları pek hoşlanmaz. Mülakatta bu konuyla ilgili bazı sorular soracağım.
- Soracağım soruların doğru ya da yanlış cevabı bulunmuyor. Bu sebeple sorulara olabildiğince dürüst cevap verebilirseniz çok sevinirim. Ayrıca sorulara cevap verirken o anda hatırlayabildiğiniz bütün örnekleri benimle paylaşırsanız çok mutlu olurum.
- Araştıra boyunca isminiz kullanılmayacaktır, bu sebeple dürüst olmamanız için hiçbir sebep bulunmamaktadır.
- Cevaplarınızı yazmak yerine ses kayıt cihazı kullanacağım, bu sizin için uygun mudur?
- Öncelikle kişisel birkaç soru sormak istiyorum.
    1. Biyolojiye olan ilgini en düşük 1 en yüksek 5 olacak şekilde sıralarsan hangi düzeydedir?
    2. Hayvanat bahçesi, müze, bilim merkezi gibi yerlere gezmeye gider misiniz?
    3. Evde belgesel seyreder misiniz?
    4. İnternette bilimsel makaleler okur musunuz?
    5. Bilim dergisi okur musunuz?
    6. İleride hangi mesleği seçeceksiniz?

ANA SORULAR

- Şimdi biyoloji konularında süregelen ilginiz ile ilgili birkaç soru soracağım. Süregelen ilgi derken kastettiğim ders dışında ve hiçbir zorunluluk olmadan biyoloji ile ilgili ne sıklıkla aktivitede bulunduğunuz.

1. Okul dışında en çok hangi biyoloji konusunda bir şeyler öğrenmeye heveslisiniz?
2. Biyoloji sizce eğlenceli mi? Niye?
3. Hayvanat Bahçesi gezisinden önce biyoloji konularına olan ilginiz ne düzeydeydi?
4. Ne gibi durumlar sizi biyoloji ile ilgili bir şeyler öğrenmeye iter?
5. Biyoloji ile ilgili yeterli bilgi seviyesine ulaşmak için ne kadar zaman harcamak gerektiğine inanıyorsunuzBiyoloji biliminin size ne gibi faydaları olabileceğini düşünüyorsunuz?
6. Biyoloji alanındaki bilgi seviyenizin ve başarınızın bu alana olan ilginizi etkilediğini düşünüyor musunuz?
7. Hayatınızdaki aileniz, kardeşleriniz, arkadaşlarınız, öğretmenleriniz ve benzeri insanlar biyolojiye olan ilginizi ne şekilde etkilemektedir?
8. Geziden sonra bu ilgi düzeyi değişti mi?
9. Gezi süresince karşılaştığınız şeyler daha sonra biyoloji ile ilgili düşünmenize neden oldu mu?
10. Gezi sizce faydalı mı?
11. Gezi biyoloji dersine bakışınızı değiştirdi mi?
12. Gezi nasıl daha faydalı olabilirdi?

Eklemek istediğiniz her hangi bir şey var mı?
Katılımınız için teşekkür ederim.

APPENDIX L

INTERVIEW CODING PORTOCOL

İnterest in biology

B.	**Biyolojiye olan ilgini bir en düşük beş en yüksek olacak şekilde sıralarsan hangi düzeydedir?**	**High interest**	**Mild interest**	**Low İnterest**
1.	Beş ve üstü	x		
2.	Üç		x	
3.	İki			x

Biological Activity Outside of the Classroom

C.	**Hayvanat bahçesi gibi yerlere kiminle ne sıklıkla ne amaçla gidersin?**	**Frequentl y**	**Sometim es**	**Never**
1.	Boş zaman buldukça giderim. Genelde akrabalarım ve eğlenmek olur genelde.	x		
2.	Altı ayda bir ailem veya arkadaşlarımla giderim. Amacım gezmek ve eğlenmek oluyor genelde.		x	
3.	Üç dört ayda bir ailem veya arkadaşlarımla giderim. Merak ettiğim için gidiyorum.		x	

D.	**Belgesel seyreder misin? Hangi kanal ve programları seyredersin? Aklında bu belgesellerden bir bilgi kaldı mı?**	**Constant watcher**	**Watch rearely**	**Never watch**
1.	National Geographic ve Discovery Channel seyrediyorum, neredeyse her gün diyebilirim fakat son iki haftadır seyretmediğim için bir bilgi hatırlayamıyorum.	x		
2.	National Geographic ve Discovery Channel seyrediyorum en çok tarihle ilgili programlar seyrediyorum.	x		
3.	National Geographic, Animal Planet ve Discovery Channel seyrediyorum, yunuslar, çıtalar ve kaplanlar çok ilgimi çekiyor	x		

E.	**Takip ettiğin bilim ile ilgili bir web sitesi var mı?**	**Constant reader**	**read rearely**	**Never read**
1.	Belirli bir site yok ama biyoloji haberleriyle karşılaştığımda dikkatlice okurum.	x		
2.	Hürriyetin teknoloji sitesine arada bakarım.	x		
3.	Facebooktan takip ediyorum		x	

F.	**Bilim dergisi okur musun?**	**Constant reader**	**read rearely**	**Never read**
1.	Sınıfımızda Bilim Teknik bulunuyor her ay, onu takip ediyorum.	x		
2.	Sınıfımızda Bilim Teknik bulunuyor her ay,onu takip ediyorum.	x		
3.	Evet, her ay Bilim Teknik alıyorum.	x		

Future Plans

G.	**İleride hangi mesleği seçeceksin?**	**Biology related**	**Not related to biology**
1.	Mikrobiyoloji	x	
2.	Pilot		x
3.	Makine Mühendisi		x

Behavioral Attitude towards to Continue to Learn Biology

H.	**Okul dışında hangi biyoloji konusunu öğrenmeye heveslisin?**	**Many subjects**	**Few subjects**	**No subject**
1.	Bakteriler ve hastalıklarla ilgili konular ilgimi çok çekiyor.	x		
2.	Biyolojiye ilgim yok.			x
3.	Hayvanlar.		x	

Thoughts about Biology

I.	**Biyoloji eğlenceli mi?**	**Yes**	**Sometimes**	**No**
1.	Kesinlikle.Çünkü öğretmenim çok iyi.	x		
2.	Bazı konuları eğlenceli. Mesela sistemlerin bir hikayesi var. Ama genelde ezber olduğu için eğlenceli diyemem.		x	
3.	Not verildiği ve ders olduğu için eğlenceli bulmuyorum.			x

Situation

J.	**Ne gibi durumlar seni biyoloji öğrenmeye iter?**	**Internal factors**	**External Factors**
1.	Yeni şeyler öğrenmek hoşuma gidiyor	x	
2.	Deneyler ve derslerden iyi not almak.		x
3.	Not alma derdim olmasa çok severim. Özellikle bitkiler ve hücre konusunu çok sevdim.	x	

Cost

K.	**Biyoloji ile ilgili yeteli bilgi seviyesine ulaşmak için ne kadar zaman harcaman gerektiğini düşünüyorsun?**	**A lot of time**	**Little time**	**No effeort is needed**
1.	Bayağı zaman harcamak gerekiyor bence.	x		
2.	Ömrüm boyunca ve sürekli vakit harcamak gerekiyor.	x		
3.	Her gün bir tekrar gerekiyor.	x		

Value

L.	**Biyolojinin sana ne gibi bir faydası olacağına inanıyorsun?**	**Health realted issues**	**Social and Cultural**	**Not useful at all**	**For academic purposes**
1.	Genel kültür sahibi olmak için bir kere gerekli. Ayrıca hastalıklarla ilgili bilgi sahibi olursak engellememiz daha kolay olur	x	x		
2.	Hayvanlar ile ilgili bilgi sahibi olmanın bana bir faydası olacağını düşünmüyorum. Ama insanlar ile ilgili bilgi sahibi olmak faydalı. Vücudumda ne oluyor, neden hastalandım bunları bilmek faydalı olabilir.	x			
3.	Diyalog kurmak için gerekli. Genel kültür sahibi olmak ve sohbet konusu açabilmek için biraz bilmek gerekiyor.		x		

Achivement on animal diversity unit Level and Interest Relationship

M.	**Biyoloji alanındaki bilgi ve başarı düzeyinin biyolojiye olan ilgini etkilediğini söyleyebilir misin?**	**Yes, positive effect.**	**Yes, negative effect.**	**No.**
1.	Kesinlikle etkiliyor.	x		
2.	Evet.	x		
3.	Evet, düşük aldıkça daha az seviyorum.		x	

Social Influences

N.	**Çevrendekiler biyolojiye olan ilgini ne şekilde etkiler?**	**Positively**	**Negatively**
1.	Harika bir biyoloji öğretmenim var. Onun sayesinde biyolojiye karşı büyük bir ilgi besliyorum.	x	
2.	Ablam tıp okuyor. O yüzden biyolojiyi daha az seviyorum. Yani ters etki yapıyor.		x
3.	Annem doktor ve bana çok baskı yapıyor. O yüzden kötü şekilde etkiliyor.		x

Effect of the Visit

O.	**Gezi öncesi hayvanlara karşı olan ilgi düzeyin nasıldı?**	**High**	**Moderate**	**Low**
1.	Daha azdı.		x	
2.	Pek ilgim yoktu.			x
3.	4 diyebilirim beş üzerinden.	x		

P.	**Gezi bu ilgi seviyeni değiştirdi mi?**	**Yes, positively**	**Yes, negatively**	**No.**
1.	Evet, kesinlikle değiştirdi.	x		
2.	Evet. Tavus kuşunun o kadar güzel olduğunu bilmiyordum.	x		
3.	Evet, latince isimler çok ilgimi çekti.	x		

R.	**Gezide karşılaştıkların daha sonra düşünmene neden oldu mu?**	**Yes, a lot.**	**A little bit.**	**No.**
1.	Evet, çok üzüldüm hayvanların durumu karşısında. Bir de bana hep ayı derler o yüzden boz ayı daha çok ilgimi çekti. Onların sürekli aynı yerde aynı hareketi yapıyor olması beni çok endişelendirdi.	x		
2.	Evet, çok üzüldüm. Bir de hayvanların ne kadar çeşitli olduğunu görmek hoşuma gitti.	x		
3.	Timsahın durgun olması beni çok şaşırttı. Zürafaların bu kadar büyük olduğunu bilmiyordum.	x		

S.	**Gezi sence faydalı mı?**	**Yes**	**A little bit**	**No.**
1.	Kesinlikle faydalı. Görmek okumaktan çok daha iyi akılda kalıyor.	x		
2.	Evet faydalı.	x		
3.	Evet faydalı, ikili adlandırma daha çok aklıma yattı.	x		

T.	**Gezi biyoloji dersine bakışını değiştirdi mi?**	**Yes**	**A little bit**	**No**
1.	Hayvanlara karşı ilgim ve merakım arttı.	x		
2.	Eğer hep gezi olsa sevebilirdim.		x	
3.	Evet, pozitif yönde değiştirdi.	x		

U.	**Gezi nasıl daha faydalı olabilirdi?**	**Suggestions about zoo**	**Suggestions about other trips**	**No suggestion**
1.	Hayvanat bahçesi yerine laboratuarda çalışmayı tercih edebilirdim.		x	
2.	Deneyler üstüne bir gezi olsa daha iyi olurdu. Sınıflandırmayla ilgili daha iyi bilgi edinebilirdik.		x	
3.	Tabelalarda daha çok bilgi olsa, yengeç, fil gibi başka hayvanlar olsa daha faydalı olabilir.	x		

V.	**Sınıf dersini mi yoksa geziyi mi tercih edersin?**	**Trip**	**Class**	**Both**
1.	Kesinlikle geziyi tercih ederim	x		
2.	Yüzde elli yüzde elli. Çeşitlilik yüzeysel kalıyor, derste de tekrar edilmeli. Fakat arkadaşlarla etkileşim oldukça iyi etkiliyor gezi sırasında.			x
3.	Tabi ki geziyi.	x		

APPENDIX M

PERMISSION LETTER

Öğrenci Gönüllü Katılım Formu

Bu çalışma, ODTÜ Eğitim fakültesi doktora öğrencisi Ilgaz GÖRMEZ tarafından yürütülen deneysel bir çalışmadır. Bu araştırmanın amacı, doğal yaşam parkı gezisinin, dokuzuncu sınıf biyoloji öğrencilerinin biyoloji dersi ile ilgili süregelen motivasyonları üzerindeki etkisini ardıl açıklayıcı nicel ve nitel karışık araştırma metoduyla incelemektir. Çalışmada üç farklı test bulunmaktadır: bir "Biyoloji Bilgi Testi" , bir "Biyoloji Öğrenmede Süregelen Motivasyon Anketi", ve bir tane "Akademik Motivasyon Anketi" nicel veri elde edilmesi amacı ile uygulanacaktır. "Biyoloji Bilgi Testi", Canlıların Sınıflandırılması ve Biyolojik Çeşitlilik konularında öğrencilerin bilgi düzeyini ölmek amacıyla hazırlanmış 5 Doğru – Yanlış, 10 çoktan seçmeli ve 5 kısa cevap içeren toplam 20 soru içermektedir. Bu testin yaklaşık cevaplanma süresi 30 dakika olacaktır. "Biyoloji Öğrenmede Süregelen Motivasyon Anketi" 8 maddeden oluşmaktadır ve bu anketin cevaplanma süresi 10 dakika olacaktır. "Akademik Motivasyon Anketi" ise 7li Likert Tipi 28 adet soru içermektedir ve cevaplanma süresi 45 dakikadır. Ayrıca gezi süresince gezi grupları arasında oluşacak diyaloglar ses kayıt cihazı ile kaydedilecek ve bu diyaloglar daha sonra "Diyalog Araştırma Metodu" ile incelenecektir. Gezi öncesi ve sonrası biyoloji alanında süregelen motivasyonlarını tespit etmek amacıyla yarı

yapılandırılmış görüşmeler yapılacaktır. Çalışmaya katılım tamimiyle gönüllülük temelinde olmalıdır. Testlerde ve görüşmelerde, sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamimiyle gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır. Geziye katılacak gruplar okul yönetimlerinin izinleri doğrultusunda belirlenmiş olup, izin verilen okullardaki bütün gruplar deney grubu olarak geziye katılacaklardır. Yönetim tarafından izin verilmemiş okullardaki gruplar kontrol grubu olarak incelenecek, gezi yerine sınıf içinde video içerikli bir aktivite ile süregelen motivasyonları değerlendirilecektir.

Testler ve görüşme, kişisel rahatsızlık verecek soruları içermemektedir. Görüşme yapılan kişi ses kayıt cihazı kullanılarak ses kaydının yapılmasına izin verdiği takdirde ses kaydı yapılacaktır. Ancak, test veya görüşme sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda testi uygulayan veya görüşmeyi yapan kişiye, testi tamamlamadığınızı söylemek yeterli olacaktır. Test ve görüşme sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Ilgaz GÖRMEZ (Tel: 536 6420222; E-posta: ilgazgormez@yahoo.com) veya Prof. Dr. Ömer GEBAN (Tel: 2104049; E-posta geban@metu.edu.tr) ile iletişim kurabilirsiniz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

İsim Soyad Tarih İmza Alınan Ders

CURRICULUM VITAE

CONTACT INFORMATION
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PERSONAL INFORMATION
Date of Birth: 03/17/1982
Place of Birth: Ankara, Turkey
Citizenship: T.C.
Sex: Female
Marital Status: Married
Spouse's Name: Gürkan Görmez
Previous Family Name: Kaynar

EDUCATION

METU Graduate of Natural and Applied Sciences	C.GPA: 3,81/4,00
Secondary Science and Mathematics Education Department, M.Sc., Ankara,	2005 - 2007
METU Faculty of Arts and Sciences Biology Department, B.Sc. Ankara, 1999 - 2004	C.GPA: 3,49/4,00 Rank 2nd in graduation
Private Arı Science High School, Ankara,	1996 – 1999 C.GPA: 4,67/5,00

EMPLOYMENT HISTORY
Academic Positions
METU Physical Education and Sports Department Student assistant of Dance Education Course, 2004 - …

Gilbert High School, Biology teacher intern, Iowa, USA, January – March 2007

Hacı Ömer Tarman Anatolian High School Biology teacher intern, Ankara, Sept. – Dec. 2006

Gazi Anatolian High School, Biology teacher intern, Ankara, January - June 2006

Private Arı High School, Biology teacher intern, Ankara, Sept. – Dec.- 2005

METU Biology Department, Student assistant of General Biology 101 course, Ankara, September – December 2003

Additional
İzmir Dans Atölyesi, Founder and Dance Sport Instructor, İzmir, 2014 - ...

Şavkar Cimnastik Kulübü, Dance Sport Instructor, İzmir, 2013-2014

Arman Esen Dans Akademi, Dance Sport Trainer, İzmir, 2013 - 2014

METU Foundation High School, Couple Dances Club Instructor, Ankara, 2006 - 2012

METU Directorate of Sports, Couple Dances Club, Dance Trainer, Ankara, 2001 - 2012
TED High School, Dance Club Trainer, Ankara, 2006- 2007

Volunteer Work
Wild Animal Rehabilitation, Hellenic Wild Life Hospital, Aegina - Greece, June – August 2003

SCHOLARSHIPS AND AWARDS
Academic
TUBİTAK, National Scholarship for Ph.D., 2010 -2012
Fulbright, Turkish Student Internship Project Scholarship, January – March 2007
METU, Graduate School of Natural and Applied Sciences, Award for highest rank in M.Sc., Ankara, 17 May 2007
6th International Environmental Project Olympiad, Special Jury Award, Istanbul, 19-20 May 1998
Other
TDSF Turkish Dance Sport League, 2nd among Turkish Athletes and become Turkish National Sports Athlete
TDSF Turkish Championship, 3rd among Turkish Athletes and become a member of Turkish National Team.

TDSF Federation Cup, 4th among Turkish Athletes, crown to A class and become a member of Turkish National Team.

CLUB AND TEAM MEMBERSHIPS
Member of Turkish Dance sport National Team, 2009 -…
Active member of METU Couple Dances Club, 2001-…
METU Scuba Diving Club, Marine Ecology Division member, 1999-2000
Table Tennis team of Yükseliş Middle School, 1993 -1996
Volleyball team of Yükseliş Middle School, 1993-1996

INTERESTS
Learning in Informal Settings, Cognitive Processes in Learning, Curriculum Design, Instructional Technology, Material Development, Teaching Evolution.

QUALIFICATIONS
Language Skills
Turkish – native language
English – fluent
Russian – elementary
Latin – lower intermediate

Computer Skills
Microsoft Office, Internet, HTML, Movie Maker.

Organizational Skills
Head of show committee in METU Couple Dances Club, 2006-…
Member of the organization committee for graduation ball and yearbook, 2003-2004
METU Couple Dances Club Executive Committee, Responsible for Technical Duties, 2003
METU Couple Dances Club Executive Committee, Responsible for Hobby Class Courses, 2002

Certificates
Turkish Dance Sports Federation Dance Sport Judicator Certificate, 2008
Turkish Dance Sports Federation Dance Sport Trainer Certificate, 2007
University of Cambridge Local Examinations Syndicate International Examination, Preliminary English Test, Pass Certificate, 1996
University of Cambridge Local Examinations Syndicate International Examination, Key English Test, Pass with Merit Certificate, 1995
Driving license: B class