

## HOW DOES THE TEACHING TIME PERIOD AFFECT THE STUDENTS' LEARNING LEVEL?

### *ÖĞRETİM ZAMANI ÖĞRENCİLERİN ÖĞRENME SEVİYESİNİ NASIL ETKİLER?*

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#### **Özet**

Araştırmanın amacı, öğretim zamanının öğrenme üzerindeki etkilerini belirlemektir. Öğretmen aynı konuyu üç farklı zamanda, sabah, öğleden sonra ve akşam sınıflarında işlemiştir. A Grubu dersleri sabah, B Grubu dersleri öğleden sonra ve B Grubu dersleri akşam saatlerindedir. Öğrencilere farklı zamanlarda ders vererek, öğrenme zamanının öğrenme düzeyi üzerindeki etkisi belirlenmeye çalışılmıştır. Dersler bittikten sonra, öğrencilere herhangi bir uyarı yapılmaksızın, aynı zamanda bir test uygulandı. Çalışmanın sonuçları, öğretim zamanının öğrenme seviyesini etkilediğini doğrulamaktadır. Araştırmada, öğrencilerin fizik dersindeki başarısı akşam sınıfında sabah sınıfından daha yüksek gerçekleşmiştir.

**Anahtar kelimeler:** öğrenme, öğretim, öğretim zamanı, öğrenme düzeyi

#### **Abstract**

The purpose of this study is to explore the effects of teaching time period on learning. Teacher taught the same topic in three different time periods in the morning, afternoon and evening classes. For a Group A lessons were in the morning, Group C had lessons in the afternoon and Group B had lessons in the evenings. Giving lessons in a different part of a day, we made an attempt to explore how teaching time affects learning level. After finishing the lessons, a test was done at the same time without any warnings. Results of this survey confirm that teaching time affects the learning level. In this survey, student achievement in a physics course has higher in the evening class than in the morning class.

**Key words:** learning, teaching, teaching time, learning level

#### **Introduction**

Although almost three centuries old, the idea of a timing system operating within living beings has come to maturity in the middle of the twentieth century. The organization of biological systems in term of time is a central issue in chronobiology. Chronobiology is a new science. Chronobiology may be defined today as a multidisciplinary effort to understand the temporal dimension of life, being mostly recognized by the study of the puzzling phenomena known as biological rhythms. Among these, circadian rhythms and the

endogenous mechanisms that generate sustained oscillations in all levels of biological systems have drawn the attention of the scientific community (Aguilar-Roblero et al. 2001: 831-832).

All living organisms have an internal timekeeping mechanism. Humans have internal cycles called biological rhythms. Some are short and can be measured in minutes or hours. They occur daily and are based on day-night cycles. For example, you rise in the morning when it becomes light, and you go to sleep at night when it is dark. Others last days or months (Nourie, 2001: 10). Arendt's (2003:427) review outlines the current state of knowledge within a physiological perspective with emphasis on human biological rhythms.

The rhythms you notice most are circadian rhythms. To date, over 100 so called circadian rhythms have been detected. Vital body processes also change according to circadian rhythms. Organs are affected. Even your cells and your nervous system work in time with your internal clock. Circadian clocks are biological oscillators that regulate molecular, physiological, and behavioural rhythms in a wide variety of organisms. Circadian is Latin for "around a day". Circadian rhythms are regular changes in mental and physical characteristics that occur in the course of a day. Most circadian rhythms are controlled by the body's biological clock. This clock in the brain, called the suprachiasmatic nucleus or SCN, generates approximately 24-h rhythmic signals which dictate the timing of virtually all circadian rhythms, including melatonin. The SCN rests in a part of the brain called the hypothalamus, just above the point where the optic nerves cross. The light/dark cycle synchronises these rhythms to the 24-h day and also changes their characteristics according to day length. Melatonin is normally synthesised at night in all species and the duration of its secretion reflects the length of the night. This changing signal is rapidly distributed throughout the body and 'read' by target organs and cells primarily through membrane receptors. Light that reaches photoreceptors in the retina creates signals that travel along the optic nerve to the SCN (Arendt, 2005:537; Healthlink, 2007; Levine et al., 2002:1; Nourie, 2001:11).

There is an apparent connection between circadian rhythm and the efficiency with which we do things in the course of the working day. Circadian rhythm is closely connected and affects the human memory. Our memory changes from morning to afternoon. When can we remember the most? Short-term memory is best during the morning hours - in fact, about 15 percent more efficient than at any other time of day. Most of people seem to reach their peak of alertness around afternoon. Therefore, long-term memory is

stronger in the afternoon. Afternoon is the best time for learning material that you want to recall days, weeks or months later. Soon after afternoon, alertness declines, and sleepiness may set in by midafternoon. Right after this peak, you can expect to feel a big drop in your energy (Callan, 1998:9; Keogh, 2007). This theme is also described widely by Perry and Dawson (1990) in their study.

Learning period that begins with birth continues throughout life. Nevertheless, student is in a constant learning of information, skills, habits and ways of conduct. Learning has been tried to be defined via different theories. Selcuk (2001:121-125) defines learning by means of informative approach as changes observed in the minds of individuals. Learning occurs by memory process. Memory comes in three sizes which are sensory storage system, short term memory and long term memory. The sensory storage system can hold information for only a very brief time period. The short term memory can hold both a small amount of information (approximately 7 units) and short term (approximately 20 second). The long term memory holds not only vast amounts of information but also very long time. The long term memory has unlimited capacity and permanent record of information (Eggen ve Kauchak, 2001:261-268; Feldman, 1996:222).

Memory is process that information is coded, recorded and recalled. Recalling is to convey the information to short-term memory from the long-term memory. Erden and Akman state that (1996) the issue of what kind of knowledge an individual bears in mind is not known since the data located in the long-term memory is in a passive condition. The data stored in the long-term memory through appealing to various coding systems is not stable. It is re-activated and used by taking back to the short-term memory when needed.

There are some factors affecting learning and recalling process. Becoming mature, former experiences, motive, attention, active participation of the students, feedback, perceptual distinguishing, semantic association and conceptual classification are some of these factors. Meanwhile one another important factor is human biological rhythms. How teaching time affects learning level is inquire in this study.

## **Method**

*Purpose:* The purpose of this study is to explore effects of teaching times on the learning level. Sub purposes of the research can be presented as follows: Does teaching time affect learning? If there is an effect when is the most successful time for learning?

*Model:* This is an experimental study. There are three experimental groups.

*Data collection:* Research was done in a boarding school in the 8<sup>th</sup> grades (14-15 year olds) at a physics lesson. Physics teacher was a volunteer who agreed to help. Teacher had to identically behave the groups and because of an exact result needed three parallel grades were chosen according to their previous term of Physics lesson average (8a, 8b, and 8c). Physics teacher was chosen because the others refused to take such a responsibility. And there is no other reason for this.

Before conducting a research the teacher was given detailed information. For data collection purpose, a test was developed by the Physics teacher and this test contained just 20 questions which were made according to the school subjects. During the process the teacher tried to instruct the students in a similar way and there wasn't any homework. There weren't any other quizzes and tests and the teacher left students with the knowledge given during the lesson.

Teacher taught one and the same topic in three different time periods in the morning, afternoon and evening classes. For a group A lessons were in the morning, Group C had lessons in the afternoon and Group B had lessons in the evenings. Table 1 given below shows the time of the lessons. Having lessons in a different part of the day, we attempted to explore how teaching time period affects the learning level. After finishing the lessons, a test was done at the same time without any warnings. It was done on the same day and the same time (from 09:30 to 10:20) for all students of different groups.

Table 1: Time Table of Lessons for Groups

	Days which held lessons			Quiz
	<i>1<sup>st</sup> day</i>	<i>2<sup>nd</sup> day</i>	<i>3<sup>rd</sup> day</i>	<i>4<sup>st</sup> day</i>
Groups	A 08.00-08.45	08.00-08.45	08.00-08.45	09.30-10.20
	C 13.15-14.00	13.15-14.00	13.15-14.00	General test
	B 19.00-19.45	19.00-19.45	19.00-19.45	

*Data analysis* is made according to the purpose and sub purposes of the research. At the analysis of data, SPSS computer programme was used. ANOVA tests, frequencies and percentage were used to analyse the data. Meaningful differences were researched by being made one-way variance analysis (ANOVA) at the level of relationship between grades. Tukey many-sided comparison test was done to determine the meaningful differences between the groups at the result of ANOVA. 0,05 meaningfulness level was taken into consideration during the data analysis.

### Findings

The information obtained from the data is tabulated below. In order to find out relations between teaching time periods and groups, ANOVA test were used.

Table 2: According to Teaching time Period Results of ANOVA Test on Physics Quiz

	<i>Sum of square</i>	<i>df</i>	<i>Mean square</i>	<i>F</i>	<i>Sig.</i>	<i>Meaningful differences</i>
Between groups	11615,303	2	5807,651	15,844	,000	1-3
Within Groups	19427,554	53	366,558			2-3
Total	31042,857	55				

According to figures in Table 2, there was a significant relation between the teaching time periods and students' test results [ $F_{(2,53)} = 15,844, p < 0.05$ ]. Tukey test was used to understand the meaningful difference between groups. A meaningful difference was found between the teaching time periods of

“morning-evening” and “afternoon-evening” classes. According to the teaching time periods the distribution of physics quiz results is tabulated below.

Table 3: According to Teaching time Periods the Distribution of Physics Quiz Results

<i>Teaching times</i>	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>
Lessons in mornings	20	30.00	21.64
Lessons in afternoons	17	34.12	15.44
Lessons in evenings	19	62.11	19.32
Total	56	42.14	23.76

Students’ results of marks, which were taken from Physics quiz, are shown in Table 3. The students’ marks are as follows: the group lessons in the mornings gained 30 points, the group lessons in the afternoons gained 34.12 points and the group lessons in the evenings gained 62.11 points.

If we define as reported Table 3, teaching time period has affected the learning level. Teaching time period in evening affects learning, as it’s more affective than in the morning and afternoon. In this study, student achievement in a physics course is higher in the evening class than in the morning class. On the other hand, the student achievement in the evening class was twice bigger than in the morning class.

Circadian rhythm has defined above in the Introduction. There is an apparent connection between the circadian rhythm and the efficiency with which we do things in the course of the working day. Circadian rhythm is closely connected and affects the human memory. Our memory changes in the course of a day. Our results are consistent with this information. The different things learned in the different time of day have different levels of knowledge.

### **Conclusion and Discussion**

Among teachers and instructors there is a common belief that teaching in the mornings is easier and attending the lessons after lunch is less successful. So the lessons which are difficult to get, such as maths, physics, chemistry are scheduled in the early hours of the working day. Because of the common belief sports, arts, music etc. are commonly scheduled in the afternoons.

In fact this isn’t at all so. Scientists of chronobiology try to understand how the biological systems function. According to their study that alertness starts in the mornings, towards the afternoon. Soon after the afternoon, alertness begins to decline. The alertness affects our memory performance. Consequently, the belief that teaching in the mornings is more efficient isn’t true.

This survey’s results confirm that teaching time affects the learning level. In this survey, student achievement in physics course has higher in the evening class than in the morning class. On the other hand,

according to this study, physics is more understandable in the evening class, than in the morning class. Is it possible for other subjects? This case can be explored by other studies.

Teachers in the evening school complain that students can not grasp the theme well. According to this survey, it is a wrong belief that teaching isn't successful because the evening time is not appropriate for memory. The reasons of this problem have to be researched in another part.

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## Geniş Özet

Eğitimciler ve öğretmenler arasında çoğu zaman sabah saatlerinde daha kolay ve kalıcı öğrenildiği kanısı yaygındır. Öğlen-öğleden sonra saatlerinin öğrenme için verimsiz olduğu genellikle düşünülmektedir. Matematik, fizik, kimya vb. öğrenilmesi zor olduğu varsayılan dersler okul programlarında sabah saatlerine konulmaktadır. Beden eğitimi, resim, müzik vb. beceri dersleri de genellikle öğlen-öğleden sonra saatlerine konulmaktadır. Chronobiology araştırmaları bunun hiç de böyle olmadığını göstermektedir. Zihnimizin uyanıklık (alertnes) düzeyinin sabah saatlerinden itibaren artmaya başladığı; öğlen yemeği ile uyanık düzeyindeki artışın durakladığını; öğleden sonrası olarak adlandırdığımız dönem bittikten sonra (akşama doğru) uyanıklık halinin üst düzeylere çıktığı ve akşam saatlerinden sonra uyanıklığın azalmaya başladığı chronobiology uzmanlarınca belirtilmektedir. Uyanıklık düzeyi de zihnimizin öğrenme kapasitesini etkilemektedir.

Araştırmanın amacı, öğretim zamanının öğrenme üzerindeki etkilerini belirlemektir. Öğretmen aynı konuyu üç farklı zamanda, sabah, öğleden sonra ve akşam sınıflarında işlemiştir. A Grubu dersleri sabah, B Grubu dersleri öğleden sonra ve C Grubu dersleri akşam saatlerindedir. Öğrencilere farklı zamanlarda ders vererek, öğrenme zamanının öğrenme düzeyi üzerindeki etkisi belirlenmeye çalışılmıştır. Dersler bittikten sonra, öğrencilere herhangi bir uyarı yapılmaksızın, aynı zamanda bir test uygulandı.

Fizik dersi için, sabah saatlerinde öğrenilen bilgilerin en az öğrenildiği; öğlen saatlerinde öğrenilenlerin biraz arttığı; akşam saatlerinde öğrenilenlerin en üst düzeyde öğrenildiği araştırma sonucunda görülmüştür. Çalışmanın sonuçları, öğretim zamanının öğrenme seviyesini etkilediğini doğrulamaktadır. Araştırmada, öğrencilerin fizik dersindeki başarısı akşam sınıfında sabah sınıfından daha yüksek gerçekleşmiştir. Bu durum, farklı dersler için de geçerli midir? Yeni araştırmalar yapılarak diğer dersler ile ilgili durum ortaya konulabilir.