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THE EFFECT OF MUSIC ON THE TEST SCORES OF THE STUDENTS IN LIMITS AND DERIVATIVES SUBJECT IN THE MATHEMATICS EXAMS DONE WITH MUSIC

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ABSTRACT
In the exams based on limits and derivatives, in this study, it was tried to determine that if there was any difference in students' test scores according to the type of music listened to and environment without music. For this purpose, the achievement test including limits and derivatives and whose reliability coefficient of Cronbach Alfa is .83 was applied with the environments in which different types of music were listened, to 98 students studying at Primary Mathematics Teaching Department in Buca Faculty of Education in Dokuz Eylul University. As a result, it was observed that both male and female students' test scores form the exam based on limits and derivatives compared to the environment without music; besides, the increase in average number of correct answers of female students was higher than the male students'.
Keywords: mathematics education, music and mathematics, mathematics success

INTRODUCTION

Mathematics and music are related to each other for many perspectives. Since the ancient times, this relationship has been realized and has attracted many mathematicians and philosophers. The effective use of the relationship between these two branches thought as the representatives of science and art may create positive results for many aspects.

A lot of studies have been done about the development of music cognitive activities. However, the study found as the most popular by media was announced as Mozart Effect in 1993 and this attracted many people. The study was carried out by Frances Rauscher. Re Maj. Piano Sonatas that Mozart wrote for two pianos was applied to 38 students studying at psychology department in the USA for 10 minutes. Then the three dimensional thinking test was applied to the students. As a Result, 8-9 higher points were obtained from the group listening to Mozart compared with the control group. The relationship between music and three dimensional thinking was realized at that time. After the announcement of the results, theoretical physicist Gordon Shaw one of the researchers claimed that Mozart's music provided brain gym and said: “we believe that complex music facilitates the communication among the particular complex neural organizations related to high level brain activities

such as mathematics and chess. (Campbell, 2002).In contrast, we think that music simple and based on repetitive may create an opposite effect" (Campbell, 2002).

In a study conducted in Australia in 1966, music education was given to the pre-school grade children 1 hour a week for 10 months. The effect of education given on mathematics skill was examined. The children's mathematics skills were evaluated by the help of Test of Mathematics Ability. As a result, from the group taking music education, higher scores were obtained (Geoghegan & Mitchelmore, 1996).

Aşkar (1996) stated that mathematics teachers and educators believed that the students' liking the mathematics or their showing interest to mathematics topics affected their success. It is known that negative motions such as anxiety influence success as well as positive emotional experiences such as motivation. It was brought out with many studies that especially mathematics anxiety had relationship with mathematics success. It has been claimed that the cognitive level of anxiety same as a mental process slows down the mental activities by keeping space in memory (Tobias and Everson, 1996).

The students, in the process beginning with the primary first class, experience mathematics anxiety originated from the teacher's negative approach, the student's personal anxiety and the personal barriers. This situation has been already observed with the answering rates' being less than the other courses.

It is seen that half of the students cannot do, think practically while solving problem or they have difficulties in doing. The trouble of problem solving is much more with female students. In terms of considering mathematics questions in university and institutions exams as difficult over the curriculum, female students remain more concerned than male students. Male students are more concerned about teacher's shouting or similar behaviors.

It is known that, in mathematics class, mathematics games with music positively influence class achievement and the students' attitudes towards the class (Dinçer, 2008). The exams have an important role in evaluating the students' success. Preparing for the exams, on the other hand, needs studying regularly, repeating the topics learned (Tan, 1992). Hedl (1972), Sarason (1980), Spielberger, Trent and Maxwell (1980) and Hancock (2001) determined that test anxiety causes the emergence of physically and psychologically negative behaviors in their studies. The students can put down their anxiety in order to avoid disturbing physical effects of test concern during the exam (Rubenzer, 1988). In the studies made about music and treatment/exercise; it was observed that music therapy may be effective in the treatment of anger and psychological symptoms (Sezer, 2009); exercises done with music is effective positively in trait anxiety (Önsü, 2005).

The Aim of the Study

The purpose of this study is to analyze the effect of music in the exams done with the music in derivatives and limits subjects on the students' test score. In addition, determining if the gender has a role on the students' test scores from the exams with music in derivatives and limits topics as well as the role of the type of music creates the other aim of the study.

METHOD

In the first stage of study run within the main aim given above, generally the situations influencing the students' achievements in mathematics classes were investigated. Furthermore, this study was made in

derivatives and limits subjects that think they are more difficult to understand than the other disciplines. The information-gathering tools used in this study are the four examinations, two of them with music and the other two without music, measuring operational performance in limits and derivatives, and generated with the questions including limits and derivatives in the level of university first grade students. Topics the exam covers were selected from the subjects the students encountered in secondary education. 5 types of music were told to the students in the groups divided homogeneously and they were asked to rank these types of music according to their preference. Then the students took the exams in limits and derivatives with this music and without, and it is tried to investigate that if there was any relationship between the type of music chosen and the points taken. In the exams, each correct answer was evaluated in points. For the analysis in these exams done with music, SPSS computer program was used. In this study, in order to examine the difference in using the knowledge they have about limits and derivatives with music, the percentage distribution was made according to the correct answers the students gave. In this study, it was also emphasized if there was any difference in the points taken from the exams in limits and derivatives according to gender as well as the types of the music.

The Population and the Sample of the Study

The research was made with 98 of the freshmen in Izmir Dokuz Eylul University, Buca Faculty of Education, and the department of Elementary Mathematics Teaching in 2010-2011 in fall semester.

Data Gathering and Analysis

The students participating the research were divided in to 10 homogeneous groups before the application. These homogeneous groups took the exams applied at a particular time period with test-parallel-test method. The validity and the reliability of the test has calculated with SPSS statistical program and the reliability coefficient was .83.

FINDINGS

Table 1: The Students' Exam Results with and without Music According to the Order of Music Preferred in Limits Topic

Groups	The Order of Music	The Type of Music in the Exam	The Score taken with Music	The Score taken without Music
GROUP 1 (11 people)	1.Classical Music 27.27%	Classical Music	63.90	65.09
GROUP 2 (9 people)	1.Softrock 44.44%	Softrock	73.88	61.33
GROUP 3 (10 people)	5. Classical Music 30%	Classical Music	50.20	35.30
GROUP 4 (10 people)	4.Pop Music 50%	Pop Music	52.80	44.00

It was observed that when taken the exam with classical music preferred as first by 27.27 % of the first group, the group's average score was 1.1 less compared to the exam without music. Its reason was determined as the students' being negatively affected from the first preference of music. It was observed that when taken the exam with Softrock music preferred as first by 44.44% of the second

group, the group's average score was 12.5 higher compared to the exam without music. Its reason was determined as the students' being positively affected from the first preference of music. It was observed that when taken the exam with classical music preferred as fifth by 30% of the third group, the group's average score was 14.9 higher compared to the exam without music. Its reason was determined as the students' being positively affected from the last preference of music. It was observed that when taken the exam with pop music preferred as forth by 50% of the forth group, the group's average score was 8.8 higher compared to the exam without music. Its reason was determined as the students' being positively affected from the forth preference of music.

Table 2: The Students' Exam Results with and without Music According to the Order of Music Preferred in Derivatives Topic

Groups	The Order of Music	The Type of Music in the Exam	The Score taken with Music	The Score taken without Music
GROUP 1 (10 people)	4.Nature Music 60%	Nature Music	62.00	52.00
GROUP 2 (10 people)	1. Softrock 40%	Softrock	52.00	42.00
GROUP 3 (10 people)	4. Nature Music 50%	Nature Music	52.00	48.00
GROUP 4 (10 people)	1. Pop Music 50%	Pop Music	32.00	38.00
GROUP 5 (9 people)	4. Classical Music 44.44%	Classical Music	51,11	37.77
GROUP 6 (9 people)	1. Nature Music 44.44%	Nature Music	35.55	57.77

It was observed that when taken the exam with nature music preferred as forth by 60% of the first group, the group's average score was 10 higher compared to the exam without music. Its reason was determined as the students' being positively affected from the forth preference of music. It was observed that when taken the exam with Softrock music preferred as first by 40% of the second group, the group's average score was 10 higher compared to the exam without music. Its reason was determined as the students' being positively affected from the first preference of music. It was observed that when taken the exam with nature music preferred as forth by 50% of the third group, the group's average score was 10 higher compared to the exam without music. Its reason was determined as the students' being positively affected from the forth preference of music. It was observed that when taken the exam with nature music preferred as forth by 50% of the third group, the group's average score was 4 higher compared to the exam without music. Its reason was determined as the students' being positively affected from the forth preference of music. It was observed that when taken the exam with pop music preferred as first by 60% of the forth group, the group's average score was 6 less compared to the exam without music. Its reason was determined as the students' being negatively affected from the first preference of music. It was observed that when taken the exam with classical music preferred as fourth by 44.44% of the fifth group, the group's average score was 13.4 more compared to the exam without music. Its reason was determined as the students' being positively affected from the fourth preference of music. It was observed that when taken the exam with nature music preferred as first by 33.3% of the sixth group, the group's average score was 22.2 less compared to the exam without music. Its reason was determined as the students' being negatively affected from the first preference of music.

Table 3: Male and Female Students' Exam Results in Limits Topic

	N	Minimum	Maximum	Mean	Std. Deviation
Female's score without music	34	13.00	88.00	48.82	22.14
Female's score with music	34	25.00	100.00	58.73	17.85
Male's score without music	6	50.00	88.00	66.83	15.25
Male's score with music	6	50.00	88.00	71.00	12.97

Female students' average score from the exam made with music in Limits Topic were 9.9 points higher than the exam without music. Male students' scores from the exam made with music in Limits Topic were 4.2 points higher than the exam without music. According to the Table 3 above, it was observed that female students' scores from the exam with music were 5.7 higher than male students' from the same exam. Although there are 18 points between male and female students in favor of male students in the environment without music, in the environment with music, it is 12.3 in favor of male students.

Table 4: Male and Female Students' Exam Results in Derivatives Topic

	N	Minimum	Maximum	Mean	Std. Deviation
Female's score without music	44	.00	80.00	48.18	21.70
Female's score with music	44	20.00	100.00	50.00	21.78
Male's score without music	14	.00	60.00	38.57	19.94
Male's score with music	14	.00	80.00	40.00	27.17

Female students' average score from the exam made with music in Derivatives Topic were 1.9 points higher than the exam without music. Male students' average score from the exam made with music in Derivatives Topic were 1.4 points higher than the exam without music. According to the Table 4 above, it was observed that female students' scores from the exam with music were 0.5 higher than male students' from the same exam. Although there are 10.4 points between male and female students in favor of female students in the environment without music, in the environment with music, it is 10 in favor of female students.

RESULTS AND SUGGESTIONS

In Limits Topic, in general, music increased the exam scores of male and female students. However, in this subject, music reduced the test scores of the students taking the exam with classical music which was their first preference. In Derivatives Topic, in general, music increased the exam scores of male

and female students. However, in this subject, music reduced the test scores of the students taking the exam in two groups with pop and nature music which was their first preference.

- In Limits subject, the students' solving problem with Softrock and Pop music can help answering the questions correctly.
- We think that, in Limits subject, the students' solving problem with their first preference Classic music can help answering the questions correctly. However, the students' solving problem with their fifth preference Classic music can help answering the questions correctly.
- In Limits subject, male and female students' solving problem with Softrock and Pop music can help answering the questions correctly.
- We think that, in Derivatives subject, the students' solving problem with their first preference Softrock music can help answering the questions correctly.
- In Derivatives subject, we think that problem solving with nature music does not help answering the questions correctly if it was preferred first, but it helps if it was preferred at the end.
- We think that, in Derivatives subject, the students' solving problem with Pop music can help answering the questions correctly. However, in this subject, the students' solving problem with Classical music can help answering the questions correctly.
- In Derivatives subject, male and female students' solving problem with music can help answering the questions correctly.

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