

THE EFFECTS OF STUDENT-CONTENT INTERACTION ON ACADEMIC PERFORMANCE IN DISTANCE-LEARNING COURSES

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ABSTRACT

Information technology is a widely used tool to facilitate teaching and learning activities in tertiary education. Distance learning courses designed and delivered via information technologies present opportunities to students with difficulties in enrolling and attending courses in higher education. Students enrolled in these courses are expected to participate in the technology supported learning environments and interact with the content presented through distance education technologies. This study is designed to elaborate on the factors that have effect on student success in two undergraduate courses taught through distance education technologies. Participants of this study are 124 freshman students. The aim of this study is to investigate the effects of student-content interaction on academic performance via a detailed analysis of data retrieved from the distance learning environment. This study will also shed light on the relationship between gender differences and success levels in distance education courses with respect to participation performance.

Keywords: Distance learning, academic performance, student-content interaction.

INTRODUCTION

Though for centuries learning and teaching activities have been carried out in face-to-face format, beginning from the second half of the 20th century peoples' needs changed and the demands of the new era entailed flexibility and diversity in educational practices. By the help of educational technologies, educators ensured flexible and diverse instructional designs and the number of educators using internet and multimedia contents increased to a great extent (Menchaca & Bekele, 2008). In the new era, educators in traditional universities presented distance education programs to those who are hardly able to attend regular programs. However, as the teaching has been practiced in the presence of both the teacher and students for centuries, distance education programs are considered as something odd. Advocates of traditional education programs claimed that a person can only acquire and assimilate knowledge by human to human interaction and discussion (Garrison, 1993). Hence, educators practicing distance education have tried to increase the quality of the teaching materials and systems in order to prove the effectiveness of those programs.

Moore & Kearsley (2005) states that success of distance education programs depends on the extent to which the learners are provided with appropriate structure and the appropriate quantity and quality of interaction between instructor and learner. Furthermore, structure and interaction are the two most critical factors in the success of distance learning and they are much more important than the learners' characteristics and course delivery format (Stein et al., 2005). Noting those facts, educators' main concern has been overcoming so called *distance defect* via more interactive instructional designs created through well use of computer and web technology. Those educators' efforts ended in well structured distance education programs using qualitatively excellent teaching materials.

Since distance learners, facing a new learning environment that entails self-management of learning, independent learning skills and the ability to engage in activities, sufficient amount of learning interactions and support are essential in distance education (McLoughlin & Marshall,2000:1). Researchers reported that high quality and levels of interaction are closely linked with academic achievement (Jung et al., 2002; Picciano, 2002). Since it is of vital importance in distance education, educators tried to figure out the nature of interaction and Moore (1989) identified three-dimensions of interaction as either learner to content, learner to instructor, or learner to learner. Moore (1989) also states that the learner's intellectual interaction with content leads to changes in the learner's understanding, perspective and the cognitive structure of the learner's mind. Learner-content interaction is directly related to the time spent with course content including textbooks, PowerPoint, web pages, and discussion forums (Su, Bonk, Magjuka, Liu, & Lee, 2005). The quality of distance learning programs basically depends on the level of interactivity (Dzakiria, 2005). Vrasida (2000) notes that all education is based on learner-content interaction which is the most important form of interaction. Furthermore, Garrison & Cleveland-Innes (2005) consider interaction as central to the educational experience and they claim it should be primary focus in the study of learning outcomes in online classes. The focal point of this study will be learner to content interaction and its effects on academic achievement in a distance education program carried out in tertiary education.

DISTANCE LEARNING MANAGEMENT SYSTEM AND SYSTEM INFRASTRUCTURE

In the selected higher education institution, undergraduate and graduate programs are carried out on a platform called Computer Aided Training & Educational Services (CATS) which is a kind of Learning Management System (LMS). CATS, being a part of SAKAI open source project, has been developed in that institution in accordance with the institutional needs. CATS is already used by 994 instructors and 12,612 students so that average number of entries per month is 155,000 and the average number of unique user entry to the system is 9500 per month.

CATS, as a technology based learning platform, including a number of tools employing educational technology in line with contemporary learning approaches supports distance education practices of the institution. CATS tools can be grouped under three main headings which are Content Management, Collaboration and Assessment. The tools and their functions are as follows:

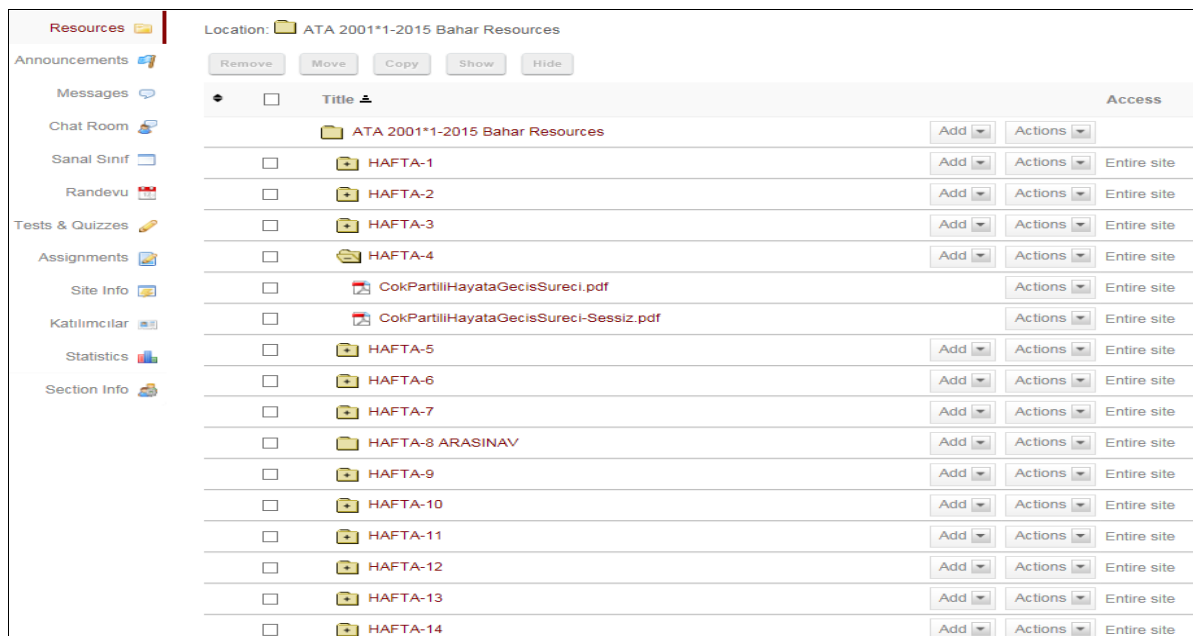
Content Management

SYLLABUS: It is for posting a summary outline and/or requirements for the course.



Figure 1: Main Page of the Course

RESOURCES: It is for posting all digital course documents in any file format, or sharing some related URLs, independent of time and place.



Resources		Location: ATA 2001*1-2015 Bahar Resources	
		Remove Move Copy Show Hide	
	Title		Access
	ATA 2001*1-2015 Bahar Resources	Add Actions	
	HAFTA-1	Add Actions	Entire site
	HAFTA-2	Add Actions	Entire site
	HAFTA-3	Add Actions	Entire site
	HAFTA-4	Add Actions	Entire site
	CokPartliiHayataGecisSureci.pdf	Actions	Entire site
	CokPartliiHayataGecisSureci-Sessiz.pdf	Actions	Entire site
	HAFTA-5	Add Actions	Entire site
	HAFTA-6	Add Actions	Entire site
	HAFTA-7	Add Actions	Entire site
	HAFTA-8 ARASINAV	Add Actions	Entire site
	HAFTA-9	Add Actions	Entire site
	HAFTA-10	Add Actions	Entire site
	HAFTA-11	Add Actions	Entire site
	HAFTA-12	Add Actions	Entire site
	HAFTA-13	Add Actions	Entire site
	HAFTA-14	Add Actions	Entire site

Figure 2: Resources of the Course Arranged in Weeks

DROPBOX: It enables the instructor and students sharing specific documents, so students can take documents from the instructor based on their needs. Since students can upload files via this tool, instructors can also use this tool for monitoring student progress.

LESSONS: It enables the instructor to create learning scenarios by developing content modules for desired periods or even for the whole course.

WIKI: It enables the instructor and students to create the web page contents of the course via collaborative creation.

WEBPAGE: Web pages that could be a resource for the course can be accessed directly from the platform via this tool.

EXTERNAL TOOLS: It provides to run the external learning tools improved in Information Management Standards (IMS), on the course website.

Collaboration

CALENDAR: All activities of the course can be planned via this tool.

MESSAGES: It allows all participants of the course to communicate.

FORUM: All participants of the course are enabled to discuss various topics under the opened titles. This tool creates a cooperative learning environment.

APPOINTMENT: For the face to face interaction with the instructor, students are able to get an appointment via this tool.

ANNOUNCEMENTS: This tool is used for posting current and time-critical information.

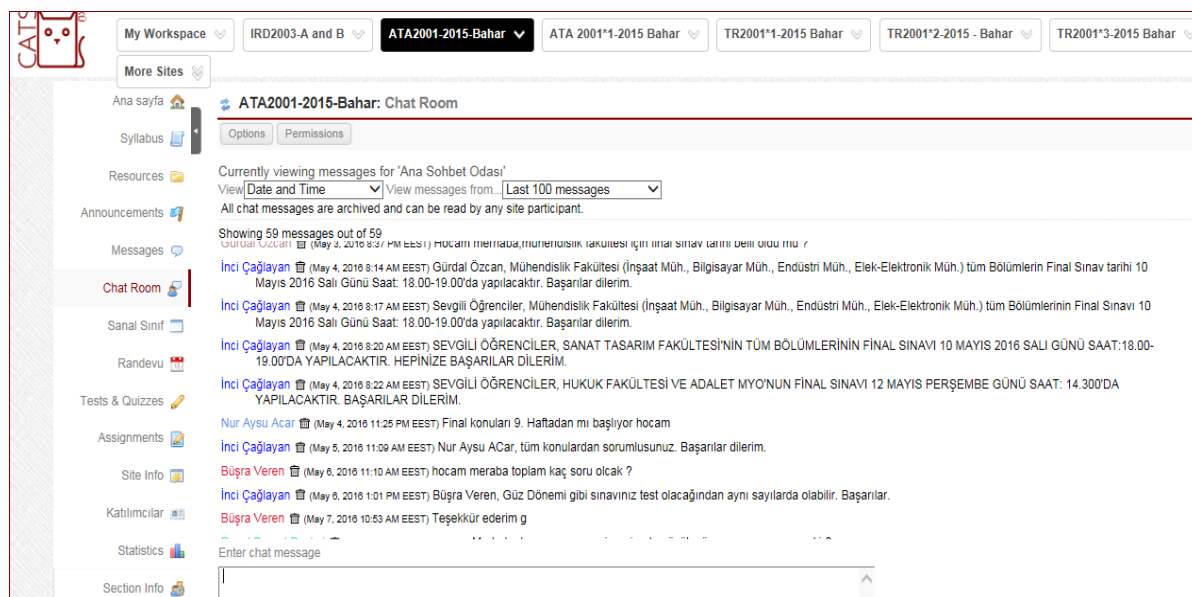


Figure 3: Chat Room Tool Screenshot

CHAT ROOM: It is instant messaging tool for real time conversation in written form.

VIRTUAL CLASSROOM: It is a tool which gives an opportunity to the participants to meet in the same virtual environment, sharing documents, whiteboard and desktop. Virtual classroom is Adobe Connect Videoconferencing service integrated with CATS.

Assessment

GRADEBOOK: The grades of the all tests and quizzes taken on the system are stored automatically in this module. It also allows the instructor to key in the grades manually, so the final grade of each student can be calculated with different weights of each grade.

TESTS & QUIZZES: Online tests and surveys with different types of questions and scenarios can be created via this tool.

ASSIGNMENT: This tool is used for the creation, forwarding and evaluation of online assignments.

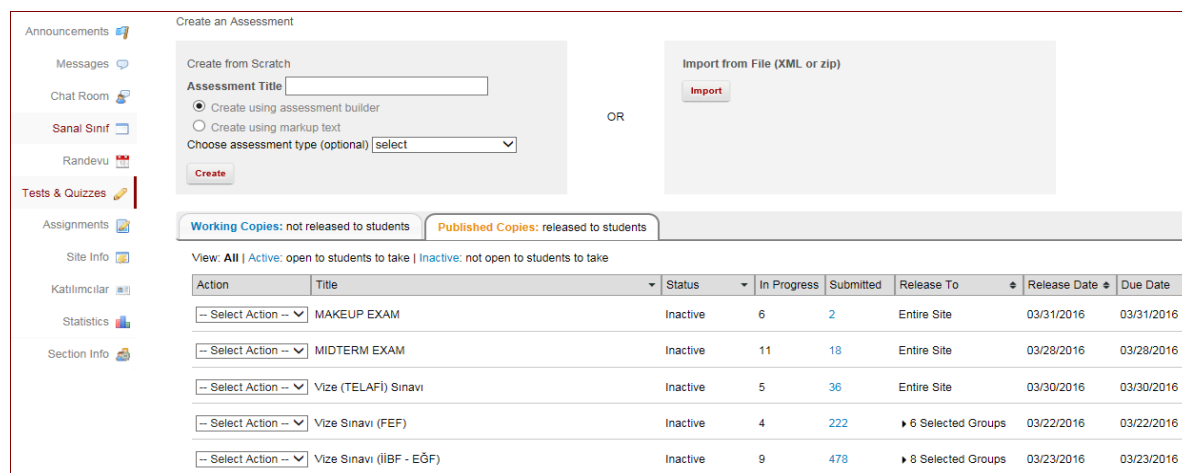


Figure 4: Tests and Quizzes Tool Screenshot

PLAGIARISM REPORTING: CATS platform has an integration with Turnitin plagiarism reporting services, so the uploaded assignments are scanned through different scientific databases and detailed plagiarism report is constructed to contribute to the evaluation of the assignment.

SITE STATISTICS: Records of each activity of the users of all courses are kept via this tool on CATS platform.

Using the above mentioned components, online courses are carried out via digital documents. Resources in pdf file format including audio and/or video content, prepared by using Adobe Presenter program and documents in any file format are uploaded to the resources of the course in the CATS. Also URL of some related web pages can be uploaded as a resource. All the resources are organized in folders named by the belonging week number, according to the syllabus released on the site. Student can access to the content week by week. Student can contact with their instructors directly via messages or e-mail tools. Instructors are present in the Chat Room for real-time conversations according to the timetable on the home page of the course. Additionally students can get an appointment via Appointments tool for the face to face meetings with the instructor. Participating the Virtual Classes are held twice per week according to the program announced from the homepage of the course. The midterm exam is taken online and it is prepared by the instructor on the CATS. For that purpose, question pools are constructed as a first step and the exam is created from the pools belonging to the each chapter randomly.

Participants

The subjects participated in this study were 66 male and 59 female students enrolled in distance education courses in a four year higher education institution. They were all freshman students from the departments of economics, business administration, international trade, law, architecture, civil engineering, industrial engineering, computer engineering and electronics engineering, taking two compulsory distance education courses.

Data Collection And Analysis

The purpose of this study was to investigate the effects of student-content interaction on academic performance via a detailed analysis of data retrieved from the distance learning environment. This study also aimed at discovering the relationship between gender differences and success levels in distance education courses with respect to participation performance. Data of the research is derived from CATS platform. The Statistical Package for Social Sciences (SPSS) was used for the purpose of data entry, manipulation, and analysis. Descriptive statistics (means and standard deviations) were used to describe the study sample. Assessment of the normality of the data is done via Kolmogorov-Smirnov and Shapiro-Wilk tests. Comparison of means was done using t-test. The level of significance selected for this study was $p < 0.05$ level.

FINDINGS AND DISCUSSION

The research hypotheses of this study and the findings related to these hypotheses are as follows. The first research hypothesis of this study is stated as, "There is a correlation between learner-content interaction and students' achievement levels". Findings related to this hypothesis are presented below.

Table 1: Interaction and Achievement Mean Scores of the Group

	Mean	Std. Deviation	N
Interaction	17.4080	8.94796	125
Achievement	81.5600	15.86760	125

The total number of participants of the study is 125. Interaction and achievement mean scores of the whole group are presented in Table 1. The normality of the data was assessed by Kolmogorov-Smirnov and Shapiro-Wilk tests. The results of those tests are presented in Table 2.

Table 2: Results of by Kolmogorov-Smirnov and Shapiro-WilkTests

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Interaction	.214	125	.000	.775	125	.000
Achievement	.173	125	.000	.899	125	.000

** a LillieforsSignificanceCorrection

First of all, using SPSS normality of the data was checked by Kolmogorov-Smirnov and Shapiro-Wilk tests. According to the Kolmogorov-Smirnov (p-value: 0,000) and Shapiro-Wilk (p-value: 0,000) test results, neither the interaction data nor the achievement data is normally distributed. Since the data was not normally distributed, in order to find out the correlation coefficient between learner-content interaction and students' achievement levels Spearman correlation coefficient was calculated. Correlation coefficients between the two variables are shown in Table 3.

Table 3: Correlation Coefficients Between the Variables Interaction and Achievement

Spearman's rho		Interaction		Achievement
		Correlation Coefficient	1,000	.250(**)
		Sig. (2-tailed)	.	.005
		N	125	125
	Achievement	Correlation Coefficient	.250(**)	1.000
		Sig. (2-tailed)	.005	.
		N	125	125

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

Analyzing the Spearman correlation coefficients, it is found that there is a positive and statistically significant relationship (p-value: 0,005) between the learner-content interaction and students' achievement levels. But this relationship is weak (Spearman correlation coefficient: 0,25)

The second research hypothesis of this study is stated as, "There is a no statistically significant difference between male and female students in their learner-content interaction and achievement levels". Findings related to this hypothesis are as follows. Means of learner-content interaction and achievement levels for both female and male students are presented in Table 4.

Table 4: Means of Learner-Content Interaction and Achievement Levels for Both Genders

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Interaction	Female	59	17.1695	8.73588	1.13731
	Male	66	17.6212	9.19492	1.13182
Achievement	Female	59	83.5593	14.62316	1.90377
	Male	66	79.7727	16.81190	2.06940

According to Table 4, male and female students' learner-content interaction rates (the former: 17.16 and the latter: 17.62) are almost the same. Comparing the achievement means of the male and female students, it is also found that there is no great difference between the two groups.

In order to find out whether there is a statistically significant difference between the interaction and achievement means of the male and female students, t-test applied. T-test results, presented in Table 5, showed that for both variables i.e. interaction and achievement there is no statistically significant difference (Achievement p-value: 0.18; interaction p-value: 0.77) between the two groups.

Table 5: T-test Results for Interaction and Achievement

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Achievement	Equal variances assumed	.854	.357	1.336	123	.184	3.78659	2.83398	-1.82310	9.39629
	Equal variances not assumed			1.347	122.915	.181	3.78659	2.81190	-1.77943	9.35262
Interaction	Equal variances assumed	.774	.381	-.281	123	.779	-.45172	1.60916	-3.63696	2.73352
	Equal variances not assumed			-.282	122.531	.779	-.45172	1.60452	-3.62790	2.72446

Interaction is an essential element in education and it is of the seven principles of good practice in schools (Chickering & Gamson,1987). Pointing out the importance of learner-content interaction, Tuovinen (2000) asserts the critical importance of learner-content interaction and states that it leads to student learning. The findings of this study also shows that there is a positive and statistically significant relationship between the learner-content interaction and achievement means of the students. Though the relationship is statistically significant, it is also found that this relationship is weak. The mean score of learner-content interaction for the whole group is quite low. The importance of interaction in distance education is evident. But in order to realize the acknowledged effect of interaction on learning, the number of interactions should be sufficient enough to create the expected effect on learning. It is mostly probable that the participants of this study having spent 12 years in traditional teacher centered and controlled classrooms lacked the motives to engage in self-learning activities through interacting with the content presented via distance learning system. Traditional learners' transition into becoming active learners in distance education programs is not an easy task (Saw et.al., 1999). Another finding of this study is there is no statistically significant difference between the interaction and achievement means of the male and female students. The similarity of interaction rates of both male and female students points out the fact that both group of students are equally affected by the teacher-centered education and their concept of learning is almost identically-the interaction mean scores of both male and female students is 17- shaped by their previous learning experience.

CONCLUSION AND RECOMMENDATIONS

Educators and students of the new age faced a new challenge of fulfilling the 21st century demands. Overcoming this challenge basically depends on creating student-centered learning environments. Distance learning settings are quite much more student-centered learning environments entailing students' self-propelled actions to acquire knowledge. It is a real challenge for graduates of conventional forms of education to adapt the distance learning programs heavily based on learner to content, learner to instructor, or learner to learner interaction. After spending years in teacher-centered classrooms and being exposed to one way - teacher to learner- interaction, it is difficult for traditional learners to become active distance learners. Thus, instructional designers and curriculum developers, employing the latest technologies to increase the interactivity of the delivery systems, are supposed to take learner characteristics and needs into consideration and the teachers are to assume new roles in order to increase the effectiveness of distance learning environments. Both in traditional classrooms and distance learning settings, student learning depends primarily on what the students do rather than what the teacher does. As the findings of this study also point

out learner-content interaction has positive effect on achievement and the success of distance education is determined by the structure and the quantity and quality of interaction between instructor and learner.

IJONTE's Note: This article was presented at 7th International Conference on New Trends in Education - ICONTE, 13- 15 May, 2016, Antalya-Turkey and was selected for publication for Volume 7 Number 3 of IJONTE 2016 by IJONTE Scientific Committee.

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