Effects of Learner-Content Interaction Activities on the Context of Verbal Learning Outcomes in Interactive Courses

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Abstract

Interaction is one of the most important components of open and distance learning. According to Moore, who proposed one of the keystones on interaction types, there are three basic types of interaction: learner-teacher, learner-content, and learner-learner. From these interaction types, learner-content interaction without doubt can be identified as the most fundamental one on which all education is based. Using the learner-content interaction activities in course materials, Anadolu University, by its Open Education system, tries to involve learners in deep and meaningful learning practices. Considering the lack of studies adopting this approach, as well as its being a study on the use of e-learning materials in Open Education system, this research holds a big value in open and distance learning literature. In this respect, the present study aimed to investigate a) which learner-content interaction activities included in interactive courses are the most effective in learners' achievement of verbal information learning outcomes and b) to what extent distance learners are satisfied with these learner-content interaction activities.

For this study, a quasi-experimental research design was adopted. The 120 participants were divided into 6 groups randomly. While 5 of these groups received different learner-content interaction activities as a part of the experiment, the other group served as the control group. The data were collected mainly through two instruments: pre-test and post-test. In addition to those tests, learners' perceived learning was assessed with an item at the end of the program. The data collected from pre-test and post-test were analyzed by ANOVA, and in the light of the findings of this approximately 24-month study, suggestions for further design of e-learning materials within the

context of learner-content interaction activities will be provided at the conference. The current study is planned to be an antecedent for the following studies that will examine the effects of activities on other learning domains.

Introduction

There has been a long history of interaction in any educational settings (e.g., Dewey, 1938; Vygotsky, 1978), yet a relatively new one in distance education (e.g., Anderson & Garrison, 1998; Holmberg, 1983; Moore, 1989; Wagner, 1994). In its earlier times, interaction in distance education was defined by adopting two different approaches; a merely humanistic one as "in a restrictive manner to cover only those activities where the students is in two-way contact with another person (or persons)" (Daniel & Marquis, 1988, p.339), and a more mechanic one as "reciprocal events that require at least two objects and two actions" (Wagner, 1994, p. 8). In an attempt to provide more precise and agreed upon sub meanings for interaction, Moore (1989) drew attention on three types of interaction (learner-learner, learner-content, and learner-instructor). Anderson and Garrison (1998) extended the discussions in distance education literature on these three major types of interaction to the other three types of interaction (instructor-instructor, instructor-content, and content-content). However, nowadays the relatively limited understanding of interaction once accepted in distance education have been replaced with more dynamic and active forms of interaction enhanced with a wide scope of strategies and the latest implications in learning environments including simulations, games, hyperlinks, virtual worlds, discussion boards (Fuller, Kuhne, & Frey, 2011), semantic web, social media, and massive open online courses (MOOCs).

Interaction serves many important purposes in distance education transactions. Mason (1994) has listed benefits of interaction at the affective level as increasing learner motivation and interest in the content; fostering learning in deep; and encouraging critical thinking. Moreover, some studies have shown that high levels of interaction have an effect on increased learner and teacher satisfaction (Keeler, 2006; Kuo, 2014; Su, Bonk, Magjuka, Liu, & Lee, 2005), and motivation (Mahle, 2007). Last, learner-content interaction has been suggested as a critical component specifically in distance education settings (Anderson, 2003). Zimmerman (2012) has supported this by pointing out the importance of the interaction with the course content, that is learner-content interaction, as a contributing factor for the achievement of learning outcomes and course completion.

Interaction, in its all forms, can be perceived as an effective way to promote distance education (Su et al., 2005). Therefore, this paper attempts to provide an insight into the theoretical frameworks, definitions, types as well as classifications of interaction in distance education contexts, on which there has been a continuous debate for years, yet no compromise at all.

Implementing a variety of interaction activities, most distance education institutions try to engage learners in deep understanding by involving them in meaningful learning practices during their teaching processes. It is a fact that in the medium of distance education, activities, dimensions, functions, and the other components of online learning including the concept of interaction must be used distinctively from traditional face-to-face education. Especially, during the online learning material design and production processes, identifying appropriate activities within the context of interaction types holds a big importance. As can be seen in Table 1, Chou (2003) builds a framework by classifying interactive functions in online learning with respect to different interaction types.

Table 1. *The Framework for Interaction Types and Interactive Functions in Online Learning.*

Types of Interaction	**Interactive Functions in Online Learning**
Learner – Interface	Fixed-frame (menu) design Online registration Grade status tracking Assignment completion tracking Keyword search Software downloading Site map Database search Online problem diagnostics

Learner – Content	Frequently-asked-questions (FAQ) Links to related educational sites Links to related learning materials Multimedia presentation (text, graphics, animation, audio etc) User guidance on system On-line quiz for self-evaluation Push media On-line help on content Learner contributing to learning materials Individualized learning database Individualized instruction Difficult Individualized test/quiz Study guidance Jokes Sweepstakes Educational games
Learner – Instructor	Email to instructors Email to Web master Bulletin board systems (BBSs) Chatrooms Comments on the sites, course, instructor, etc. Online survey Online voting
Learner – Learner	Email to other learners Bulletin board systems (BBSs) Chatrooms Class roster

Table 1. The Framework for Interaction Types and Interactive Functions in Online Learning. Adapted from Chou, C. (2003). Interactivity and interactive functions in web-based learning systems : a technical framework for designers. *British Journal of Educational Technology*, *34*(3), 265–279.

From these interaction types shown in Table 1, learner-content interaction without doubt can be identified as the most fundamental one on which all online learning is based (Vrasidas, 2000; Anderson, 2003). In other words, efficacy, efficiency and attraction of distance education systems can be achieved by the practice of efficient learner-content interaction through appropriate activities.

Apart from interaction types, there are also some other classifications of interaction such as interaction taxonomy (Schwier & Misanchuk, 1993), interaction levels (Sims, 1997), categories of interaction (Stouppe, 1998), and types of content interaction (Shank, 2003) (See Table 2).

Table 2. *Classifications of Interaction*

Taxonomy of Interactivity (Schwier & Misanchuk, 1993)	Levels of Interactivity (Sims, 1997)	Categories of Learner-Content Interaction (Stouppe, 1998)	Types of Content Interaction (Shank, 2003)
Levels ● Reactive ● Proactive ● Mutual **Functions** ● Confirmation ● Pacing ● Navigation ● Inquiry	**Levels** ● Object ● Linear ● Hierarchical ● Support ● Update ● Construct ● Reflective ● Simulation ● Hyperlinked	**Enriching interactions** ● pop-ups ● hot-words ● links ● forward and back buttons **Supportive interactions**	● Multiple choice quizzes ● True/false quizzes ● Click on object or text to reveal more information (glossary — explanations) ● Hypertext links to other pages inside the course or program

● Elaboration **Transactions** ● Keyboard ● Touch Panel ● Pointing Device ● Voice	● Non-Immersive Contextual ● Immersive Virtual	● zoom functions ● moveable ruler bars ● calculators ● orientation/ perspective controls ● search and query functions **Conveyance interactions** ● questions ● simulations ● games ● what-if activities ● process decision points **Constructive interactions** ● building mental maps ● knowledge trees ● organization charts	● Hypertext links to resources outside the course or program ● Tutorials (step-by-step) ● Drag and drop ● Navigational choices (choice of path and sequence of information) ● Application simulations (software demos or try-it simulation) ● Process simulations (realistic case studies — immersion exercises) ● Fill in the blank ● Self-reflection questions (Why do you think that...? Have you considered...?) ● Games ● Offline/field work (ie. watch task, try program, offline labs) ● Note taking/journals ● Simulated people (ask the expert)

All in all, it is essential to decide which interaction type/s to use on the basis of learning environments, objectives, and learners' needs and interests. In an online learning setting in which the intended learning group is composed of independent learners, it would be wise to foster more learner-content interaction on behalf of supporting and enriching content specific interaction.

Methodology

Although the subject and words are the same in eLearning content, different interaction activities are designed for each experimental group. Since the last group is a control group, only subject and vocabulary is presented without any interaction effectiveness. Groups and activities are summarized in Table 1.

Table 1. Groups and Activities

Group 1	Game (Puzzle)
Group 2	Fill in the blank
Group 3	Ranking
Group 4	Pairing
Group 5	True/false quizzes
Group 6	No interaction (Control Group)

Participants of the study were selected by convenience sampling method and then randomly assigned to the control and experimental groups. The data were collected with 2 basic tools, pre-test and post-test. Pre-test is presented as 17 questions (ANNEX-1). Post-test is presented as two parts. The first part consists of 17 questions English test (ANNEX-2) and the second part consists of gender, age, perceived learning, and satisfaction (Annex-3). In addition to this section, they were also asked whether they had previously taken English courses in the Open Education System, whether they had entered the system and whether they used tablets.

In addition to the information collected through pre-test, post-test and questionnaire, e-learning materials offered by HTML5 and SCORM have shown the answers to what the students answered at the event, how many points they got and how much time they spent.

Data of 120 students collected in 6 different groups were analyzed by SPSS. The first 5 groups were the experimental group and the 6th group was the control group. To answer the question, "How effective are learner-content interaction activities in learning learners' verbal knowledge from Gagne's learning outcomes?", the control group and all other groups were examined with ANCOVA analysis by using pre-test, post-test and survey data.

FINDINGS AND COMMENTS

In the study with 120 participants, 43% of the participants were female and 57% were male.

When the correct answers given to the pre-test where the response rate is 99.1%, the result in Chart 1 is revealed:

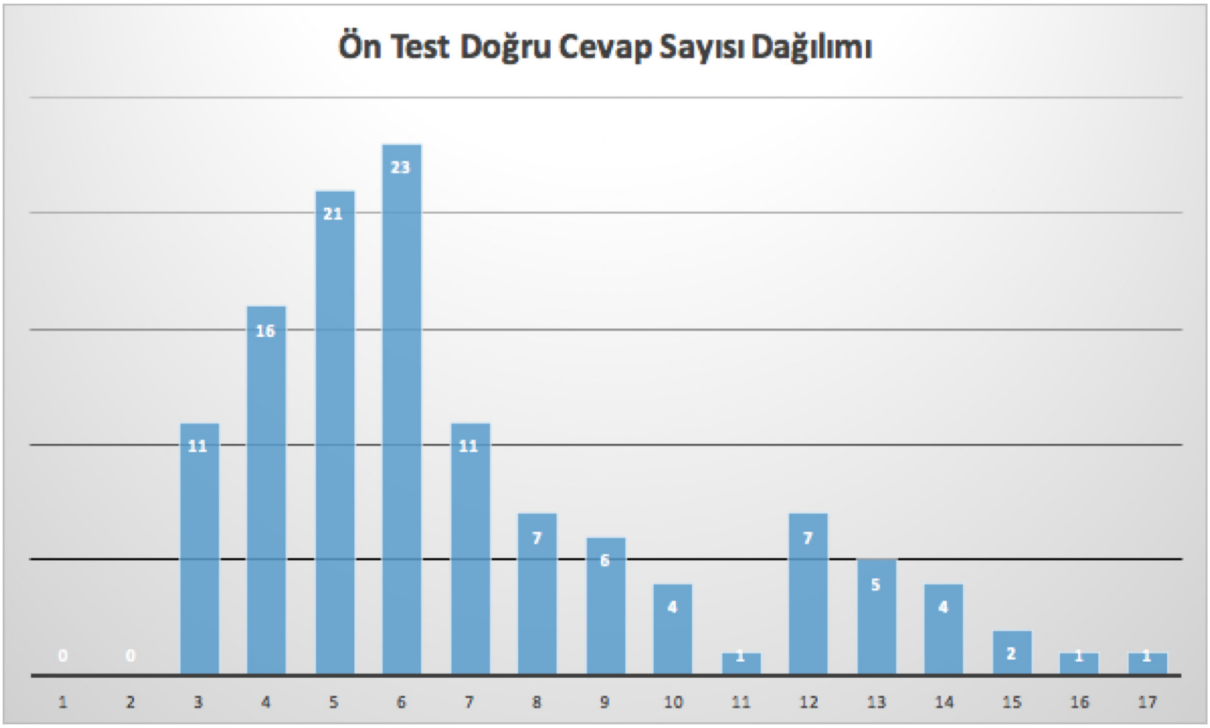

Chart 1. Status of correct answers according to pre-test responses

Accordingly, it was observed that all participants gave at least 3 correct answers. The total number of participants is 1. The response rate is 99.3% and the correct answers given to the post test are given in Chart 2.

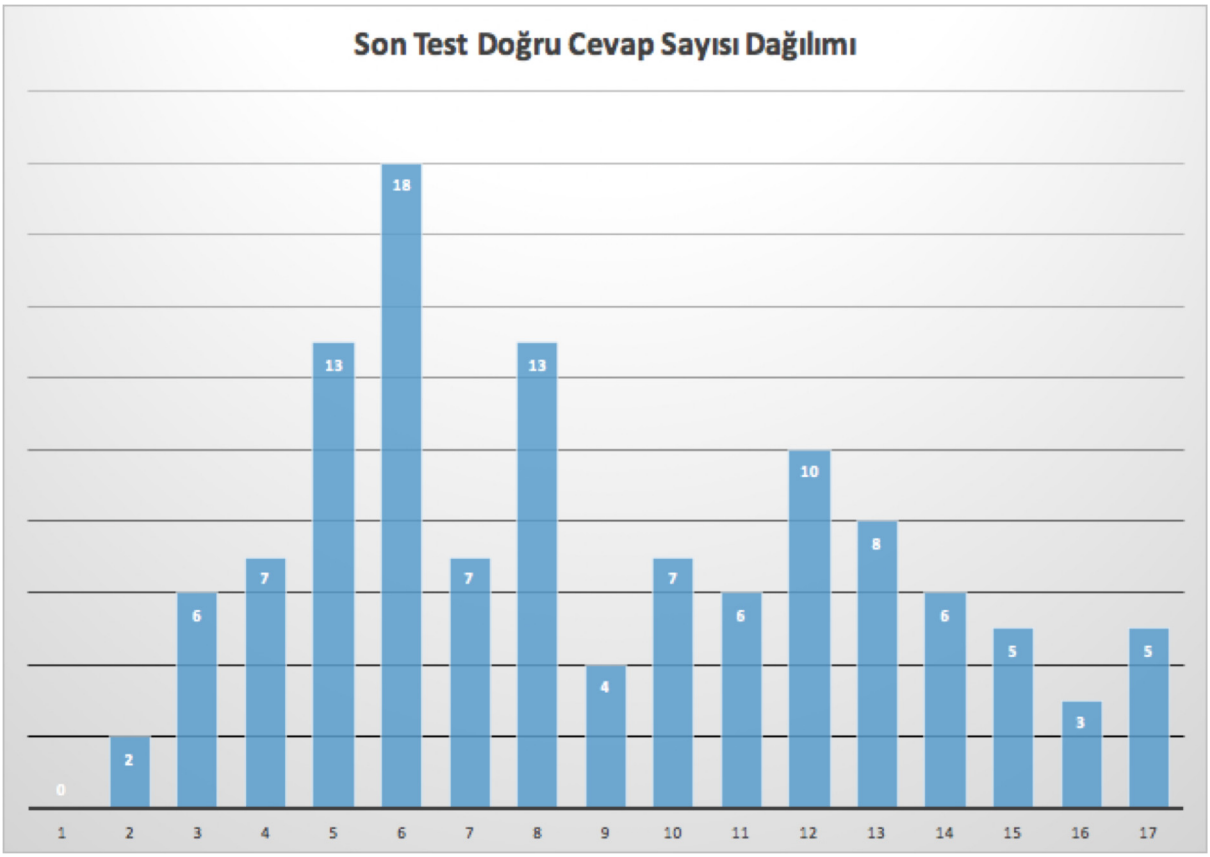

Chart 2. Status of correct answers in post test answers

The correct response rate given in the pre-test was 41.5% (846 correct answers in total), the correct response rate was 52.2% (1064 correct answers in total).

Data of 120 students collected in 6 different groups were analyzed by SPSS. The first 5 groups were the experimental group and the 6th group was the control group. The results of the analyzes performed within the scope of the question, ”How effective are learner-content interaction activities to learners' verbal knowledge from Gagne's learning outcomes?”, are given in Table 2, Table 3, Table 4, Table 5, and Table 6.

Table 2. Group 1 (Game) and Group 6 (Control Group)

Source of Variance	Sum of Squares	Degree of Freedom	Squares Mean	F	p	Partial Eta-Square
Model	441,279	2	220,640	26,723	.000*	.591
Pretest	417,254	1	417,254	50,536	.000*	.577
Group	14,055	1	14,055	1,702	.2	.044
Error	305,496	37	8,257			
Total	746,775	39				

*<.05

According to Table 2, there was no significant difference in post-test scores of Group 1 (Game) and control group according to pre-test scores [F(1; 37)=1.702, p>.05].

Table 3. Group 2 (Fill in the blanks) and Group 6 (Control Group)

Source of Variance	Sum of Squares	Degree of Freedom	Squares Mean	F	p	Partial Eta-Square
Model	219,439	2	109,720	12,432	,000	,402
Pretest	218,214	1	218,214	24,726	,000	,401
Group	8,486	1	8,486	,962	,333	,025
Error	326,536	37	8,825			
Total	545,975	39				

*<.05

According to Table 3, there was no significant difference in the posttest scores corrected according to Group 2 (Fill in the blanks) and pre-test scores of the control group [F(1; 37)=.962, p>.05].

Table 4. Group 3 (Ranking) and Group 6 (Control Group)

Source of Variance	Sum of Squares	Degree of Freedom	Squares Mean	F	p	Partial Eta-Square
Model	322,162	2	161,081	18,944	,000	,506
Pretest	240,937	1	240,937	28,335	,000	,434
Group	18,013	1	18,013	2,118	,154	,054
Error	314,613	37	8,503			
Total	636,775	39				

*<.05

According to Table 4, there was no significant difference in the post-test scores of Group 3 (Ranking) and control group according to pre-test scores [F(1; 37)=2.118, p>.05].

Table 5. Group 4 (Pairing) and Group 6 (Control Group)

Source of Variance	Sum of Squares	Degree of Freedom	Squares Mean	F	p	Partial Eta-Square
Model	280,527	2	140,264	13,333	,000	,419
Pretest	262,302	1	262,302	24,933	,000	,403
Group	3,203	1	3,203	,304	,584	,008
Error	389,248	37	10,520			
Total	669,775	39				

*<.05

According to Table 5, there was no significant difference in posttest scores of Group 4 (Pairing) and control group according to pre-test scores [F(1; 37)=3.203, p>.05].

Tablo 6. Group 5 (True- False) and Group 6 (Control Group)

Source of Variance	Sum of Squares	Degree of Freedom	Squares Mean	F	p	Partial Eta-Square
Model	270,885[a]	2	135,443	22,104	,000	,544
Pretest	269,285	1	269,285	43,948	,000	,543
Group	,115	1	,115	,019	,892	,001
Error	226,715	37	6,127			
Total	497,600	39				

*<.05

According to Table 6, there was no significant difference in the post-test scores of Group 5 (True-False) and the pre-test scores of the control group [F(1; 37)=.115, p>.05].

When these results were examined, it was seen that there was no significant difference between the experimental groups and the control group in terms of post-test scores corrected according to pre-test scores.

The results of the analysis for the question of "*How effective the learning activities of selected learner-content learners are at perceived learning levels?"* are given in Table 10.

Table 10. Comparison among groups in terms of perceived learning

TEST GROUPS	PERCIEVED LEARNING
GROUP 1 (Game)	t(37)= -1.081, p>.05
GROUP 2 (Fill in the blanks)	t(36)= .039, p>.05
GROUP 3 (Ranking)	t(36)= .273, p>.05
GROUP 4 (Pairing)	t(37)= -.182, p>.05
GROUP 5 (True-False)	t(37)= .014, p>.05

In addition, the same analyzes were repeated in terms of the student satisfaction variable. The results are given in Table 11.

Table 11. Comparison among groups in terms of satisfaction

TEST GROUPS	**SATISFACTION**
GROUP 1 (Game)	t(37)= .443, p>.05
GROUP 2 (Fill in the blanks)	t(36)= .043, p>.05
GROUP 3 (Ranking)	t(36)= .527, p>.05
GROUP 4 (Pairing)	t(37)= -.257, p>.05
GROUP 5 (True-False)	t(37)= .862, p>.05

When the answers of the participants to the questions about their satisfaction and perceived learning status were examined, it was seen that there was no significant difference between the 5 groups and the control group.

Results

In the light of the information obtained, it was observed that the learner-content interaction activities chosen in this study did not make a significant difference in the access of the learners to verbal information. Also, it was observed that these activities did not make any significant difference in the perceived learning levels and satisfaction of the learners.

The lack of success difference between the interaction groups and the control group can be explained by the high level qualifications of the control group learning material. When the pre-test and post-test success scores were examined (between 7.90 and 10.75 on 17 full points), it was observed that all groups including control group had a similar increase. Therefore, these results are considered to shed light on the identification of learning environments where the types of interactions covered in the study are more effective and necessary.

Another factor explaining that there is no difference is thought to be the content area used. The basic knowledge of English as the content of the learning material is selected. The scale of Turkey's target audience is also known to have low levels of English. Therefore, the fact that success change in English language skills, which is already hard to learn, has not increased enough after a short learning experience in this study, may be the reason why there is no difference among the groups.