The Effects of Multi-Stimulus Learning and Teaching Processes on Undergraduate Students' Reading and Writing Skills

Esra Karakaş Kurt

Department of Social and Turkish Education, Cyprus International University, Nicosia, Northern Cyprus

Abstract:
This study aims to test the effects of the multi-stimulus learning-teaching processes on undergraduate students' reading and writing skills. To this end, a quasi-experimental was designed at a university in Cyprus with 42 students in the experimental group and 39 in the control group. While the participants in the control group were treated with traditional techniques of teaching, those in the experimental group were taught by means of multi-stimulus aids for sixteen weeks. Data were collected using a reading comprehension multiple-choice test (as a pre- and post-test) prepared by the researcher, a composition test was administered as a pre- and post-test, which was assessed with a rubric. Repeated-measures ANOVA results showed a significant difference between the two groups in favor of the experimental group regarding the students' reading and writing skills. However, in the test results regarding the level of their knowledge, no significant difference has been detected. The research results show that multi-stimulus education environments are more effective than traditional education environments in developing the reading comprehension and written expression skills of an individual studying in higher education. Language courses should be conducted in accordance with the level in a 'language classroom' environment, which allows the structuring of multi-stimulus educational environments, as it requires multiple stimuli by nature. Also, the effect of multi-stimulus learning-teaching processes on other language skills may be the subject of future research.

Keywords: multi-stimulus educational environments, reading comprehension, writing skills.

多刺激学习和教学过程对本科生阅读和写作能力的影响

Corresponding Author: Dr. Esra Karakaş Kurt, Department of Social and Turkish Education, Cyprus International University, Nicosia, Northern Cyprus; email: ekarakas@ciu.edu.tr

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摘要：

本研究旨在检验多刺激学习−教学过程对本科生阅读和写作技能的影响。为此，在塞浦路斯的一所大学设计了一个准实验，实验组有 42 名学生，对照组有 39 名学生。对照组的参与者接受了传统的教学技术，而实验组的参与者则通过多刺激辅助工具进行了为期 16 周的教学。数据是使用研究人员准备的阅读理解多项选择测试（作为前测和后测）收集的，作文测试作为前测和后测进行管理，并用量规进行评估。重复测量方差分析结果显示，在学生的阅读和写作技能方面，两组之间存在显着差异，有利于实验组。然而，在关于他们的知识水平的测试结果中，没有检测到显着差异。研究结果表明，多刺激教育环境比传统教育环境更能有效地培养高等教育个体的阅读理解能力和书面表达能力。语言课程应根据"语言课堂"环境中的水平进行，这允许构建多刺激教育环境，因为它本质上需要多种刺激。此外，多刺激学习−教学过程对其他语言技能的影响可能是未来研究的主题。

关键词： 多刺激的教育環境，閱讀理解，寫作技巧。

1. Introduction

Language education is a process that paves the way for developing individuals with higher-order thinking abilities, as well as comprehension and storytelling skills. The basic aims of the Turkish language teaching are to enable individuals to (1) develop the sensitivity to humans, life, and nature; (2) enhance their critical and creative thinking; (3) use life-long reading, writing, speaking, and listening skills effectively; and (4) adopt the democratic cultural awareness. To achieve these goals, the language teaching should be structured so that the audio, visual, linguistic and artistic stimuli can be used to lead to the creative use of the language in the appropriate learning-teaching environments. Such teaching and learning environments from elementary to higher education can create a vital interaction environment necessary for developing multi-dimensional thinking and sensitivity abilities.

According to a general consensus, Turkish education suffers from considerable inefficiency and deficiency (Aslan, 2006, 2010, 2011, 2016; Demirel, 2002; Dilidüzgün, 2012; Kavcar, Oğuzkan and Sever, 2005; Sever, 2002, 2003, 2007, 2011b, 2018; Sönmez, 2004, 2007). Studies show that the deficiencies continue to exist from primary to university education, which means that individuals have difficulty expressing their feelings adequately and appropriately. Thoughts and impressions in the written and verbal forms are increasing. According to the researchers in this field, Turkish teaching has not been structured in a qualified and functional way that improves the students' language skills. Some studies examining the reading comprehension of primary school pupils show that their reading comprehension levels are below the European and world average due to the lack of sufficient reading competence, which means the Turkish educational system fails to improve adequate reading skills in individuals.

Regarding the results of the Program for International Student Assessment (PISA) conducted 2015, Turkish students have below the OECD mean scores in reading comprehension, science, and mathematical skills. The OECD average global score for reading comprehension is 460, whereas Turkish

students received 428 points in this area (Taş et al., 2016). At level 6, which includes making multiple inferences, making sense of complicated and multiple texts and correlating them, critical evaluation and several other high-level reading skills, the success rate of students is below one percent.

Research findings reveal that this linguistic insufficiency, detected in primary and secondary schools, is also seen in adults. The report titled "Skills Matter: Further Results from the Survey of Adult Skills" published by the OECD on June 28, 2016, similar to the fact that PISA focuses on the basic skills of 15-year-old students, unfolds the general state of "basic knowledge-processing skills" of adults between the ages of 16 and 65. The data of the study were obtained from the adult participants of 216,250 of 33 countries. Turkey participated in this study with 5277 adults. Turkish adults received 227 points for verbal skills, which is below the OECD average of 268. With this score in verbal skills, Turkey became one of the three lowest-performing countries participating in the research. Only Chile (220) and Indonesia (200) received lower scores than Turkey. In Turkey, 45.7% of adults showed success at level 1 and below in verbal skills. The OECD average for level 1 was 18.9 percent. However, only 0.5% of adults in Turkey showed the 4th and 5th level success in verbal skills, which are the highest levels (TEDMEM, 2016).

These results indicate serious issues in with native language education in Turkey. These issues in reading comprehension are also valid for students at the higher education level. For this reason, effective teaching techniques should be implemented for students to form reading habits and improve their reading comprehension skills.

In the context of this problem, a teaching plan has been prepared for multi-stimulus educational environments to provide solutions and to introduce different perspectives on the teaching of Turkish. This study aims to teach the native language through contemporary teaching techniques, which facilitate the development of language skills. Additionally, the effects of multi-stimulus educational environments with linguistic, visual and auditory stimuli are investigated.

To this end, the reading comprehension and writing skills of university students have been tested.

2. Multi-Stimulus Education Environment

The educational environment is an artificial or natural in which all kinds of tools and equipment and educational activities are carried out to gain the desired knowledge and skills in the education-training process.

In the education process, environments created by employing various stimuli in the educational environment to move the world of thinking and imagination of an individual constitute multi-stimulus educational environments (Bruner, 1977).

The multi-stimulus educational environment is the application area where students can express themselves freely. Students can find the differences in their skills in these application areas and demonstrate them in various ways. These contemporary educational fields, supported by technological possibilities, also have an important effect on gaining thinking abilities and sensitivity (Sever et al., 2011; Aslan 2016).

While configuring multi-stimulus educational environments, information technologies and program development are also used. Multi-stimulus educational environments, called multimedia in information technologies, are defined as learning together with sounds, visuals and words (Altınışık & Orhan, 2002; Brünken et al., 2002; Simkins et al., 2002; Huart et al., 2004; Frey & Sutton, 2010; Huang, 2005; Mayer & Moreno, 2003; Mayer & Moreno, 2002a; Reed, 2006; Mantiri, 2014; Sever, 2011a; Tarawneh et al., 2011; Vaughan, 2004). Mayer (2005) found that using words with sounds and visuals is effective in the learning process. In these environments, which are defined as reflecting a tool with pictures and texts in different ways, the nature of the added stimuli and the ways of working should also be considered. The number, nature and the place of using stimuli are essential. These educational environments are student-centered and require their active participation. While creating multi-stimulus educational environments, it is necessary to take advantage of the innovations and principles of computer technologies (Ayres & Sweller, 2005; Moreno & Ortegano-Layne 2007).

Mayer has designed a holistic learning model that incorporates different approaches to ensure that learning is permanent. In this theory, Mayer demonstrates by using the multimedia tools of learners how presentations about memory emerge (Mayer, 2005). The most critical step in this stage is blending visual and verbal information (Tabbers et al., 2000). The student rationally organizes the visual information according to the action and reaction relationships and, based on his previous knowledge, establishes connections between this information according to the visual and verbal mental models (Mayer & Moreno, 2002b). Simultaneously, this environment provides more meaningful learning owing to the high interaction among students (Moreno & Valdez, 2005).

Multimedia teaching enables students to develop their understanding skills by establishing a relationship between visual and verbal information (Mayer & Moreno, 2003). Mayer and colleagues have studied the effects of multimedia presentations on human learning for more than a decade. As a result of the experimental processes, it was found that the students learned the words better with the pictures, the visual and verbal information was more easily comprehended when they received the information simultaneously, the extraction of off-topic words and pictures accelerated the learning, and the students learned better with expression and animation (Mayer, 2005). Referring to the effects of multimedia presentations on learning, Doolittle (2008) stated that while presenting related text and images, text and images should complement each other and be presented simultaneously.

The visual and auditory texts used in the research; show that they positively affect academic achievement, attract the attention of learners and perpetuate learning (Ainsworth, 2008; Ashaver & Igyuve, 2013; Ke et al., 2006; Mayer & Moreno, 2002b; McVicker, 2007; Morison et al., 2002; Ode, 2014; Tejwani, 2012; Teoh & Neo, 2007).

Computer-aided multimedia teaching in the literature is not sufficient for this research; artistic stimuli to be used effectively in class must also be added to learning processes. The selection and quality of artistic stimuli to be used in this educational environment, which is structured with a holistic approach, is important in this sense. The stimuli used in this study; short films, caricatures, pictures, photographs and music (Liou et al., 2003 Ainsworth, 2008; Ke et al., 2006, Mayer & Moreno, 2002b; McVicker, 2007; Tejwani, 2012 Morrison et al., 2002; Russell, 2009; Huber, 2009; Ho et al., 2003).

As a result, these studies in the literature reveal that multiple stimuli impact students' learning and teaching processes and are necessary for educational settings. In this context, multiple linguistic, visual and auditory stimuli should be employed in learning-teaching processes, and multi-stimulus educational environments should be configured.

2.1. The Present Study and Hypotheses

In this study, the answer to the following question was sought: "Is there a difference between reading and written expression skills acquisition scores of the group where the multi-stimulus learning-teaching processes are applied in Turkish classes, and reading and written expression skills acquisition scores of the group where the multi-stimulus education environments are not applied?"

Based on the aims of this study, the researcher generated these hypotheses as follows,

Hypothesis 1: There is a significant difference in favor of the experiment group between the acquisition level of the experiment group and the control group with regards "knowledge," "comprehension" and

"total" levels of reading skills.

Hypothesis 2: There is a significant difference in favor of the experiment group between the acquisition level of the experiment group and the control group with regards "knowledge," "application" and "total" level of writing skills.

Hypothesis 3: There is a significant difference in favor of the experiment group between reading and writing skills and "overall total" acquisition mean scores of the experiment group and control group.

Hypothesis 4: There is a significant difference in favor of the experiment group between the acquisition level of the experiment group and the control group as regards "essay-writing" (writing expression) level of writing skills.

3. Methods

3.1. Design

A quasi-experimental design was used that included two groups (experimental and control) and two measures (pre-test, post-test) to examine within and between the effects of the subjects.

3.2. Sample and Recruitment

The research was carried out in Turkish I: Written Expression courses at the first-year undergraduate students of the Cyprus International Education of Faculty for sixteen weeks. The research was conducted on two groups determined by random assignment among all undergraduate students who took the Turkish I: Written Expression course. One of the two groups was used as the experiment group (n = 42) and the other as the control group (n = 39). The students in the groups were examined in terms of their gender, number and readiness to determine whether the groups were equivalent. The equivalence of both groups in terms of their physical environment, was ensured. To determine this, reading comprehension skills and written expression skill pretest scores were compared, statistical procedures were performed, and an experimental procedure was applied after determining the equivalence. The students in the experiment and control groups were not given any information about whether they were in the experiment or control groups, and the researcher carried out the education in both groups.

3.3. Measures

The multi-stimulus educational environments used in the research were created taking account the principles of Mayer and Moreno (2003). The principles required to create an effective design in multiple learning environments are as follows: method principle, temporal and spatial contiguity principle, multimedia principle, personalization principle, consistency principle, redundancy principle, pre-training principle, coding principle, rate adjustment principle. When the multi-stimulus educational environment is mentioned,

the accumulation of stimuli should not come to mind. Linguistic texts were supported by one of the visual and auditory texts. For example, a linguistic text has been associated with cartoons, short films, pictures and music. Cartoons, short films, pictures and music were used in the writing works. Care was taken to select appropriate stimuli in each activity area.

3.3.1. Reading and Writing Skill Measurement

The researcher developed the skill measurement, required to measure the research hypotheses. This test measures students' reading comprehension and written expression skills. In terms of the validity and reliability of the research for Reading and Writing Skill Measurement, the Turkish questions prepared by ÖSYM (The Measuring, Selection and Placement Center), asked in the Transition to Higher Education Examination in the last decade and shared on the official website formed the question pool of the scale. ÖSYM has authorized the use of the questions provided that the following phrase is used: "All rights of these questions belong to ÖSYM. For whatever purpose, copying, photographing, reproducing or using, publishing in any way, all or part of them is subject to exclusive written permission of ÖSYM." To discover the effects of the experiment on the participants, an achievement test was designed for this study. Based on the curriculum objectives and Bloom's Taxonomy (Bloom, 1956, 1997), four types of questions were constructed for the test:

1) 'Knowledge' questions,
2) 'Comprehension' questions,
3) 'Application' questions, and
4) 'Analysis' questions.

At least three multiple-choice questions were selected from the question pool to test each outcome based on the objectives. The questions of this scale, which was prepared to measure reading and writing skills, and the objectives/gains related to the questions were presented to the opinions of the field experts and assessment and evaluation experts. A pre-test test consisting of 71 questions (41 reading comprehension, 30 written expressions) was prepared in line with opinions, criticisms and suggestions. To test the sample reliability, this test was applied to the upper and lower groups of the pre-test sample group. Reading and Writing Skills Measurement was first applied to senior students at high school, who were selected by the neutral appointment method in line with the permission granted by the Cyprus Ministry of Education. As the upper group, it was applied to the third and fourth-grade students (174 students) of the Turkish and Social Sciences Education Department. The responses obtained were analyzed with the SPSS program. In this analysis, the difficulty indices (p_j), discrimination power indices (r_{jx}) and item reliability (r_j) of each item were calculated. Additionally, arithmetic mean, standard deviation and reliability values for all items of the scale were identified. As a result of the statistical analysis of

the data obtained from the preliminary trial, the general arithmetic mean of the measurement tool consisting of 71 questions was found as x = 43,484, the standard deviation was found as S = 15,237, the minimum number of correct answers was found as 7, the maximum number of correct answers was found as 58, KR-20 reliability coefficient of the test was found as 0.91, average difficulty was found as pj = 0.50, and mean distinctiveness was found as rjx = 0.13. To be able to measure the variable more precisely and to diversify the measurement, items of which the difficulty value was outside the 0.30-0.75 interval, distinctiveness values were <.30, and reliability values were <0.30 were excluded from the scale. The scale consisting of 60 items meeting these conditions was used as a tool to understand Reading and Writing Skills before and after the experimental process. Cronbach alpha reliability of the configured scale was calculated and found to be 0.91.

3.3.2. The Essay Evaluation Scale

The Essay Evaluation Scale was developed by Sever (2005) in the Turkish language. This scale is used to evaluate the compositions written by the students. The scale consists of 38 items, 100 points, with sub-dimensions of internal structure (14 items/30 points), external structure (10 items/35 points), language and expression (14 items/35 points). Example item: a. Make an interesting introduction to the article (2 points).

3.4. Data Analysis

An independent-samples t-test was performed to compare the control and experimental groups' pretest scores. To determine differences in the development of the students' knowledge, comprehension and application levels between the experimental and control groups, a 2 (within-subjects: pretest, posttest) × 2 (between subjects: experimental and control groups) mixed analysis of variance (ANOVA) was performed. In this study, the essay (written expression) pre-test and post-test data of the groups were evaluated by three different field experts by considering the Essay (written expression) Evaluation Scale. The points given by the experts over 100 were collected, and the mean score of each student was determined. The Accessibility of essay skills in both groups was determined.

4. Results

4.1. Descriptive Results

The pre-test results applied before the research show that the students in the experiment and control groups were equal/equivalent at the levels they were tested. It can be argued that the "knowledge" level (t(79)=1.66, p>.05), "comprehension" level (t(79) = 0.253, p>0.05) and "total" (t(79) = 0.533, p>0.05) acquisition scores obtained by the groups from Reading Comprehension Skills Pre-test and their "knowledge" level (t(79)=0.720, p>0.05), "application" level (t(79) = -0.42, p>0.05), "total" (t(79)= -0.13, p>0.05) and "total overall" (t(79) = 0.339, p>.05) acquisition scores obtained from the Written Expression Skills Pre-Test are equivalent. Students in the Experiment and Control groups are also equivalent in terms of "total" (t (57) = 1.874, p>.05) acquisition scores obtained from Essay (written expression) Skills Pre-Test.

The ANOVA assumptions of independence normal distribution of observations, dependent variables (Büyüköztürk et al., 2008; Creswell, 2014) (Kolmogorov-Smirnov test, p>0.05), and homogeneity of variance, were met for reading comprehension and writing dimensions. The results related to all hypotheses were as follows:

In support of all hypotheses (see Table 1), the results of a 2 × 2 mixed ANOVA revealed an interaction effect between test and group:

Hypothesis 1: Comprehension skill of the students in the experiment and control groups does not show a significant difference in terms of the 'knowledge' level acquisition average and that the observed difference is not significant at the level of .05. Reading comprehension "knowledge"-level score: Wilks' lambda = 0.997, F(2.79) = 0.267, p = 0.610>0.005.

Reading comprehension skills of the students of the experiment and control groups showed a significant difference between the "comprehension" level and "total" acquisition average and that the effects of the multi-stimulus learning environments were significant. Reading comprehension "comprehension"-level score: Wilks' lambda = 0.739, F(2.79)=27.84, p<0.01. Reading comprehension "total"-level score: Wilks' lambda = 0.775, F(2.79) = 22.950, p<0.001

Hypothesis 2: Written expression skills of the students of the experimental and control groups do not show a significant difference in terms of the 'knowledge' level acquisition average and the observed difference is not significant. Written expression "knowledge"-level score: Wilks' lambda = 0.532, F(2.79)=69.424, p>1.000.

The "application" level and "total" acquisition average of the written expression skills differ significantly in the experimental and control group students, and the effects of the multi-stimulus learning environments were also significant. Written expression "application"-level score: Wilks' lambda = 0.784, F(2.79) = 21.796, p<0.001. Written expression "total"-level score: Wilks' lambda = 0.623, F(2.79)=47.854, p<0.001.

Hypothesis 3: It was found that the comprehension and written expression skills of the students in the experiment and control groups showed a significant difference in terms of "overall total" acquisition average and that the effects of multi-stimulus learning environments were significant. Overall total score: Wilks' lambda = 0.628, F(2.79)=46.850, p<0.001.

Hypothesis 4: It was found that the essay (written expression) skills of the experiment and control group students showed a significant difference in terms of overall acquisition average and that the effects of multi-stimulus learning environments were significant. Essay

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(written expression) skill score: Wilks' lambda = 0.713, F(2.79)=32.127, p<0.001.

Table 1. Means and standard deviations of the reading comprehension "knowledge," "comprehension" level and written expression skill "knowledge," "application" level and essay (Written Expression) acquisitions in the experimental and control groups

	Scales	Experimental group (n=81)				Control group (n=81)			
		Pretest		Posttest		Pretest		Posttest	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Reading Skills	Knowledge	2.76	1.34	2.90	.95	3.21	1.03	2.95	1.02
	Comprehension	19.00	5.97	24.93	2.39	19.31	4.86	19.54	2.95
	Total	21.76	6.04	27.83	2.89	22.51	5.6	22.49	3.27
Writing Skills	Knowledge	2.36	1.27	3.43	.70	2.54	1.02	3.33	.83
	Application	14.33	3.09	17.50	1.55	14.05	2.98	13.67	1.99
	Total	16.69	3.67	20.98	1.84	16.59	3.47	17.00	2.31
	Overall total	38.45	9.10	48.76	3.31	39.10	8.05	39.49	4.00
	Essay	42.67	12.04	57.56	10.62	40.67	10.22	44.94	14.13

As it has been observed, the hypothesis that the significant difference between pre-test and post-test applications in the experimental group was caused by time factors is rejected, that the significant differences that emerged in variables other than "knowledge" dependent variables of reading comprehension and written expression skills were caused by independent variables of the experiment (multi-stimulus learning environments), and that repetitive ANOVA test results literally verified independent group results.

5. Discussion

The research results demonstrated no significant difference in favor of the experiment group between the "knowledge"-level acquisition average of reading comprehension skill and written expression skill of the experiment group where multi-stimulus learning-teaching processes are applied at Turkish courses based on native language teaching at Higher Education and "knowledge"-level acquisition average of reading comprehension skill and written expression skill of the control group. These hypotheses have not been verified.

Learning methods in experimental and control groups can be equally effective in ensuring knowledge-level acquisitions. The level of knowledge includes acquisitions such as reciting, recognizing, remembering and speaking (Anderson & Bloom, 2001). It can be concluded that the traditional method, known to be effective in obtaining memorized acquisitions, is effective in the acquisitions at the level of knowledge due to this feature. There may not be a close relationship between the reading comprehension skills' knowledge and comprehension levels. Acquisitions of experiment and control groups at the comprehension level, such as participating and finding the subject, main idea and message of a text can be witnessed despite deficiencies at the knowledge level. Remembering the knowledge-level questions in the measuring tool may have affected the acquisition levels of both groups at this stage. The student can predict the meaning of the word from the progress of the text and give the correct answer to the question. This can be done even more easily in multiple-choice measurement questions. These findings have affected the result.

It can be argued that the educational situations in which multi-stimulus educational environments are employed and the written expression skills of traditional educational environments have a similar effect on the knowledge-level acquisition mean scores, and are equally effective in acquiring the knowledge-level gains. Although the difference in terms of the pre-test and post-test knowledge acquisition average of the experimental and control groups is in favor of the experimental group, this difference is not significant.

The questions on the knowledge level of the Written Expression Skill Measurement Tool are related to punctuation marks and spelling rules. Therefore, the gains related to this knowledge bring about the rote-learning processes. It cannot be claimed that multi-stimulus education environments are more effective than traditional education environments in routine processes. Additionally, the fact that the number of questions that measure the knowledge-level gains of written expression skills in the measurement tool is low can be considered among the reasons for not having a significant difference in the level of knowledge (Aslan 2006; Sever, 2011b; Turhan, 2016). These findings have affected the result.

A significant difference was revealed in favor of the experiment group between the acquisition average at 'comprehension' level of reading comprehension skill of the experiment group where multi-stimulus learning-teaching processes are applied in Turkish courses based on native language teaching at Higher Education and the "comprehension" level of reading comprehension skill of the control group where multi-stimulus learning-teaching processes are not applied. This hypothesis has been verified.

The acquisition level of the experiment group at reading comprehension skill comprehension level was obtained by employing multi-stimulus education environments at activities directed at reading comprehension processes. The reasons for this can be shown as the willingness to participate of students in learning processes by thinking, producing and having fun, diversifying the educational environment (Guimaraes et al., 2000) with linguistic, visual and auditory stimuli, and providing reading pleasure and desire by creating motivating opportunities toward reading.

The rapid development of information technologies has necessitated the development of different tools to be used in education. For this purpose, studies on stimuli used in education in various fields of educational sciences (Ainsworth, 2008; Chauke & Tabane, 2021; Chiang, 1996; Lin, 2002; Liou et al., 2003; Ke et al., 2006; McVicker, 2007; Mayer & Moreno, 2002b; Morrison et al., 2002; Schnotz, 2002; Schnotz et al., 2002; Tejwani, 2012; Zimmerman & Smit, 2014) support these hypotheses.

Care has been taken to select literary stimuli for

developing reading comprehension skills as the literary stimuli have implicit message richness and meaningfulness that allow students to reveal hidden meanings. Therefore, the implicit messages and a vast universe of meaning presented in literary texts have contributed to the process of making sense of the text and created an environment in which they can think freely. These articles are a partial review of the literature that supports an investigation on the possible impact of multimodality on foreign language learning, with particular emphasis on text design (Kress & Van Leeuwen, 2001) and models of multimedia learning (Fraenkel & Wallen 2006; Farias, Obilinovic & Orrega, 2011; Schnotz, 2005; Mayer, 2001; Moreno & Mayer, 2000).

In the educational situations employed in the experiment group, the questions regarding the comprehension of the language and thought structures of the literary texts were determined beforehand and the textual structure of the text was structured under the guidance of the questions. The fact that the mean score of experiment group students in comprehension level of reading comprehension skills is significantly different from that of the control group is the result of the employment of multi-stimulus education environment. It can also be argued that this application, which creates a significant difference between the groups, is not affected by other factors or variables (such as time or other variables).

The level of comprehension includes gains such as the student appropriating knowledge, making sense of it and making a prediction (Anderson & Bloom, 2001). Therefore, it may not be possible for the student to understand what he/she is reading, to predict before and after the text, in a single activity. This may require the use of different stimuli and activities in educational settings. Students who actively participate in these activities can make it easier to understand what they read. These activities can be educational techniques such as discussion, decision making, tracing, criticism, and questioning. These techniques can also occur in multi-stimulus learning environments. This situation can be effective in obtaining gains at the level of comprehension.

This research shows no significant difference in favor of the experiment group between "application"-level acquisition average of written expression skill of the experiment group where multi-stimulus learning-teaching processes are applied at Turkish courses based on native language teaching at Higher Education and "application"-level acquisition average of written expression skill of the control group. This hypothesis has been verified.

The success of the experiment group at the level of written expression skills was achieved by employing multi-stimulus education environments in activities conducted for writing studies in the experiment group. Visual, linguistic and auditory stimuli employed in writing can be shown as the reasons for the significant difference (Ke et al., 2006; McVicker, 2007; Morison,

George & Chilcoat, 2002; Ode, 2014; Tejwani, 2012; Teoh & Neo, 2007).

It was stated that linguistic, visual and auditory stimuli were used in the acquisition of gains related to spelling and punctuation rules in the experiment group. The crux of the matter is the way these stimuli are operated. It was assured that the rules and principles are structured and made explicit by students based on stimuli (Mayer, 2005; Mayer & Moreno, 2003).

The absence of audio and visual stimuli that will help make sense of linguistic stimuli and the continuation of traditional education environments based on narrative alone in the control group, which is taught without multi-stimulus learning environments, may be among the reasons that the acquisition levels of students in the control group do not reach the acquisition levels of students in the experiment group. The fact that the average of the written expression skills of the students in the experimental group is significantly different than that the control group can be considered a result of the educational situations in which multi-stimulus education environments are employed.

A significant difference was observed in favor of the experiment group between the acquisition average at 'essay (written expression)' level of the experimental group where multi-stimulus learning-teaching processes were applied in Turkish courses based on native language teaching at Higher Education and the 'essay (written expression)' level of the control group where multi-stimulus learning-teaching processes are not applied. This hypothesis has been verified.

The success of the experiment group in essay (written expression) skills was achieved by employing multi-stimulus education environments in activities conducted for writing studies in the experiment group. Visual, linguistic and audio stimuli that work in writing can be shown as the reasons for the significant difference. The use of various linguistic, visual, audio and artistic stimuli as a tool in learning environments in accordance with the language and meaning universes of students may encourage them to produce imagination and thoughts (Sever, 2011b).

6. Conclusion

The research results show that multi-stimulus education environments are more effective than traditional education environments in developing the reading comprehension and written expression skills of an individual studying in higher education. The research also strengthens the argument that the impact of multi-stimulus learning-teaching environments on university students' reading comprehension and written expression skills can also contribute positively to the purpose-oriented development of listening and speaking skills.

The following recommendations can be made regarding the findings obtained from this research: Artistic stimuli should be included in the course content to improve language skills in higher education Turkish courses. While preparing the syllabus and educational

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conditions, the lecturer should employ artistic stimuli to deliver the skills that are ignored in the objectives and content dimensions of the course. Pre-service teachers should undergo hands-on training on how to structure multi-stimulus education environments. In the teaching processes of the pre-service teachers, multi-stimulus learning-teaching processes should be employed, and the language skills of students should be developed from primary to higher education. Teachers should undergo in-service training processes regarding multi-stimulus learning-teaching approaches. The effect of multi-stimulus learning-teaching processes on reading comprehension and written expression skills can also be tested in terms of permanence. Language courses should be conducted in accordance with the level in a 'language classroom' environment, which allows the structuring of multi-stimulus educational environments, as it requires multiple stimuli by nature.

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