

## The Relationship between Prospective Teachers' Levels of Critical Thinking and Their Success in Academic Writing

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### *Abstract*

The aim of this study was to find out the relationship between prospective teachers' levels of critical thinking and their success in academic writing. Participants of the research were 181 prospective teachers from six different departments. The data regarding the participants' levels of critical thinking were collected via the Watson-Glaser Critical Thinking Appraisal, and the data related to the levels of success in academic writing were gathered through evaluation of academic essays. The gathered data were analyzed with the statistics program. As a result of the analysis, a statistically significant relationship was found between prospective teachers' levels of critical thinking and their success in academic writing. Depending on the findings of the research, it is suggested to take the levels of critical thinking into account in order to increase the levels of success in academic writing.

*Keywords:* Critical thinking, academic writing, prospective teachers.

### **Introduction**

The writing skill develops in line with the other basic language skills and the individual's world knowledge, vocabulary, orthographic knowledge and background knowledge. The ability to produce texts, language awareness, vocabulary knowledge and the thinking skill are the major components of writing. The thinking skill is of particular importance among these components. As one of the types of thinking, critical thinking plays a significant role in enabling the thesis put forward by the writer in the text to be well-grounded. Since the thesis constituting the main idea of the text is structured based on some subordinate ideas, the consistency between them determines the success of the text. Hence, formation of the thesis in a written message and its positioning in the text depends on the consistency of the relationship between the main idea and subordinate ideas.

The pattern of the opinions to be expressed in a written text is formed in the stage of planning. Planning takes place within the process of thinking that is carried out before text production. The aim of the text is identified by thinking, relevant ideas are produced, and the generated opinions are organized within planning, which is a prominent part of the writing process (Flower and Hayes, 1981). Critical thinking that functions in the background of the text plays a crucial role in generating ideas and creating reasonable and acceptable relationships among them (Vallis, 2010). Thus, understanding whether there is a relationship between the critical thinking skill and the success in academic writing is an important point that can contribute to the planning of writing studies.

### *Critical Thinking*

Thinking is a mental and behavioral process used for identifying the purpose in life and setting goals (Chaffee, 1994). Thinking, which is the guide of human activities, requires benefitting from the relationships among objects and events, reaching a result by this way and carrying out mental processes on the gathered information. Cognitive awareness, critical and creative thinking, thinking processes, basic thinking skills and subject area knowledge that make up basic dimensions of thinking (Kaya, 1997) are the means used for establishing these relationships.

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Thinking is the process of symbolic mediation (Morgan, 1984). The individuals who want to change the nature make use of the act of thinking (Gibson, 1984). An abstract action map is produced by way of thinking, and then this map is concretized with a number of instruments. The relationship of thinking to language comes out at this point. Thinking, which is a linguistic and symbolic behavior (Arik, 1987), shapes the topic to be explained. The logical system of thinking necessitates reasoning, making inferences, and regarding baseless arguments and ideas as invalid (Paul, 1995). The stages of thinking are *input*, *process* and *output* (Sağlam, 2002; cited in Kürüm, 2002). Input is associated with information and learning. Process means the ability to use the information purposefully in new cases. As for output, it is reflecting the new information reached through language or behaving accordingly. The quality of thinking is observed in this phase.

There are various kinds of thinking. Beyer (1988) discusses thinking skills under three headings: problem solving, decision making and conceptualizing skills; critical thinking skills and information processing skills. Swartz and Perkins (1990) divide thinking into four as critical thinking, creative thinking, decision making and problem solving. Critical thinking aims at evaluating the clarity of opposing situations or ideas as distinct from the other kinds of thinking. Criticism has a prominent role in individuals' determining important and unimportant points and making sense of stimuli (Semerci, 2000). In this respect, criticism helps finding the essential bases for a job to be done. Critical thinking is the process of evaluating premises and evidence meticulously, and then reaching objective results by keeping in mind all the elements and making use of valid methods of logic (Oğuzkan, 1993). Therefore, an individual who thinks critically questions the validity and correctness of an argument before adopting it (Demirci, 2000).

Many definitions have been made in the literature regarding critical thinking (Demir, 2006). These definitions focus on various dimensions of critical thinking. Hudgins and Edelman (1986) highlight the dimension of critical thinking regarding finding relevant evidence before accepting some results. Carter (1973) indicates that critical thinking carefully evaluates clues and evidence, and aims at reaching objective decisions using appropriate cognitive processes. Ennis (1985) places the process dimension of critical thinking at the forefront, emphasizes its three different aspects comprised of judgement, knowledge development and questioning, and states that critical thinking is the kind of thinking that is reflective and rational. Watson and Glaser (1964) specify critical thinking as the individual's ability to see assumptions, values, attitudes and beliefs. Almost all of these approaches treat critical thinking with its process dimension from its starting in mind to its transformation into behavior. Yet, Halpern (1989) focuses on the end of the process, and asserts that critical thinking is a kind of purposeful, rational and goal-oriented thinking. In a similar vein, Paul (1988) identifies critical thinking as obtaining results based on observation and information.

According to Mcknown (1997), critical thinking requires reasoning, contemplation and focusing. Inferences are based on valid evidence. Contemplation is associated with developing an idea and evaluating others' viewpoints. As for focusing, it involves setting a goal and making a decision accordingly. These three features complement each other and constitute thinking. Watson and Glaser (1964) claim that critical thinking comes out as a result of a combination of knowledge, skills and attitudes. Recognizing the problem, finding evidence for the arguments that have been put forward, acquiring knowledge regarding the accuracy of evidence, turning this process into an attitude and using it comprise the content of critical thinking. Based on this definition, Watson and Glaser (1964) address critical thinking by dividing it into five dimensions as inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. Kazancı (1989) mentions the processes of critical thinking and gathers them under the titles of defining the problem, making a hypothesis, testing the hypothesis, making inferences and judgement. Cüceloğlu (1993) discusses them under the headings of identifying the problem, determining its limits, finding out positive and negative sides of the options, solution and evaluation.

The aforementioned definitions of critical thinking highlight its various dimensions. The significant point for this research is that critical thinking occurs within processes that are similar to the processes of academic writing. Forming an idea based on some subordinate ideas is equal to creating the main idea by using these subordinate ideas. In this regard, thinking determines the form and quality of writing.

#### *Academic Writing*

Writing is the act of producing a written text so as to transfer a message. The writing ability is a language skill that develops late due to the fact that many elements such as knowledge and awareness of language, skills of text production, world knowledge and thinking function together in written text production. Individuals are expected to have advanced thinking skills so that the content of the text to be written can be formed successfully. It is important for organization of thoughts within the text to be well-structured since the aim is to clearly transfer the writer's opinions and bases of the thesis to the reader especially in the type of academic writing.

Zwiers (2008) notes that academic language aims at conveying complex ideas, higher order thinking processes and abstract concepts, and defines academic writing as the arrangement of vocabulary, grammar and organization strategies that is essential for fulfilling these purposes. Pointing out that writing is a means of thinking, this definition indicates that thinking occurs before writing and shapes it.

Academic writing is a kind of text in which opinions are logically structured and justified. Essays written by university students, research reports and theses are among types of academic writing (Gillet et al., 2009). Academic writing, which is different from fiction writing, introduces the writer's opinion on the topic and bases this opinion on a scientific foundation. Academic essays are usually written for comparing two points, discussing a solution, introducing a project, summarizing information, reporting a research study or experiment (Boardman and Frydenberg, 2002). These topics have a scientific quality in accordance with the academic life.

Davis and McKay (1996) point out that writing is a structural, strategic and social activity, and that the act of writing involves strategic organization and construction of the text. By this way, the reader comprehends the text more easily. In this respect, academic writing has a conventional structure, too. The paragraphs in the body part of a writing of this kind starts with a topic sentence, and the other sentences elaborate on the information that is put forward in the topic sentence. Within the thesis statement that appears at the end of the introduction paragraph, reference is made to the topic sentences existing at the beginnings of the paragraphs in the body part. The ideas that start to be addressed with the thesis statement and continue to be discussed in the body paragraphs are referred to in the conclusion paragraph again, and the issues explained are brought to a general conclusion related to the thesis (Bailey, 2003; Zemach and Rumisek, 2005).

The features of academic writing that are distinct from the other types of texts are within the dimensions of *content*, *organization*, *language use* and *word choice*. Academic quality of writing depends on its consisting of an idea that is dealt with rational and scientific bases. Expressions are shaped according to a certain organization. Moreover, standard language is used in academic writing. In addition to standard language, certain terms can be included in academic essays within the scope of the jargon belonging to the relevant area. Since the target readers know this jargon, they do not have difficulty in comprehending the text. In academic writing, metalinguistic function of the language comes out with the word choice that is far from slang. These points are the basic characteristics required for the academic essays of university students and science experts.

According to Grabe and Kaplan (1996), organization of knowledge within the text occurs via various models such as definition, description, classification, comparison, problem and solution, cause and effect, analysis, and synthesis. The aforementioned models employed for organizing knowledge enable the writer to construct the text effectively and help the reader to understand the thesis of the text with ease. Furthermore, the specified models reveal the writer's way of thinking about the topic.

In this regard, organization of knowledge within the text can be considered as the concrete form of the writer's opinion on the topic.

*The Relationship of Critical Thinking to Academic Writing*

There is a distinct relationship between language and thought. Saussure (1998) states that the limits of a non-verbalized opinion will be uncertain. According to Yalçın (2010), language is both the foundation and carrier of an idea. The foundation aspect is associated with its form of functioning whereas the carrier aspect is related to its transmission of the thought from the sender to the receiver. Vendryes (2001) emphasizes that a word undertakes everything conveyed by a thought, and reflects the whole attraction of the idea. These opinions lay bare the closeness of the relationship between language and thought.

The ability to use the language means establishing an acceptable relationship between language and thought in a sense. If the language used is not an appropriate pattern for the idea to be transferred; in other words, if it does not address the idea completely, it can be thought that an unimproved expression is adopted (Binyazar, 1998). Therefore, it is necessary to properly choose the linguistic units that will convey the idea after its construction. The comprehension and evaluation process of the reader begins after this stage. The reader needs critical thinking skills in order to carry out this process successfully. Critical thinking facilitates comprehension of the content in an expression. Mayer and Goodchild (1990) define critical thinking as an active and systematic process of understanding and evaluating discussions. The concept of *discussion* involves an argument about the relationship between multiple objects or phenomena, and evidence supporting or refuting this argument. This construct bears resemblance to the process of text production during writing.

Cüceloğlu (1993) highlights the importance of a person's getting aware of his/her own thinking process, examining others' thinking processes and applying them in life so that the process of manipulating critical thinking skills can be maintained efficiently. The points emphasized by Cüceloğlu (1993) are oriented towards transmission of what is thought. Each text consists of ideas with various aspects of events in itself. The bases of these opinions are presented within the development of the text. The links among ideas within the text are tested by the reader during the process of reading. The people with a high level of critical thinking skills can effectively establish the links among ideas during the process of text production.

Another key point in the act of writing is to identify the subordinate ideas that will place the main idea at the forefront, introduce it to the reader in all aspects and help him/her feel it. Each idea to be transferred should create a map that reaches the main idea in the reader's mind. In addition, it should be within the scope of and associated with the main idea. As stated before, the writer's carrying out these aspects successfully within the process of text production depends on his/her manipulation of critical thinking skills. The writer should differentiate significant knowledge from the insignificant one during the process of text production. Şahinel (2001) asserts that the selection skill is crucial for the development of critical thinking because the writer selects the prominent information that will ideally put forward the main idea and lead the reader to it among a large amount of information while producing the text. The writer's evaluation, selection and manipulation of information fill an important gap underlying writing. The style of expressing the ideas within the text creates a level of importance for each one of these. The relationships and logical inferences among thoughts lead the reader to a specified main idea. In this regard, it can be said that a written text reflects the writer's opinion construction and quality.

When literature is examined, it is seen that the research studies on prospective teachers' critical thinking skills in Turkish are usually descriptive studies. Karadüz's (2010) study is a review describing the relationship between critical thinking and language skills. It is also seen that studies have been conducted in order to reveal Turkish language teacher candidates' opinions on tendency toward critical thinking (Çetinkaya, 2011), and whether levels of critical thinking differ according to various variables (Şen, 2009). There are also research studies determining prospective teachers'

tendencies toward critical thinking (Türnüklü and Yeşildere, 2005) and examining its relationship to various variables (Ekinçi, 2009; Dutoğlu and Tuncel, 2008). Moreover, the use of critical thinking in lessons (Demirkaya, 2008), the relationship between university students' attitudes toward critical thinking and their research anxiety (Çokluk Bökeoğlu and Yılmaz, 2005), and the relationship between critical thinking and academic achievement (Akbıyık, 2002) have been discussed in some studies. However, no studies aimed at examining the relationship between prospective teachers' levels of critical thinking and their success in academic writing have been encountered.

Critical thinking is regarded as a major variable for constructing the content of the text and structuring the relationships among ideas although there are a number of preconditions for generating a successful text. Finding out the relationship between the level of critical thinking and success in academic writing constitutes the general purpose of the present research. In order to reach this aim, answers have been sought for the following questions:

1. Do the prospective teachers' levels of critical thinking differ according to the departments they are studying at?
2. Do the prospective teachers' levels of success in academic writing differ according to the departments they are studying at?
3. Is there a significant relationship between prospective teachers' levels of critical thinking and levels of success in academic writing?

### Method

The present study, which aims at determining the relationship between the level of critical thinking and success in academic writing, and whether they differ according to the departments, is a descriptive study in relational screening model. Relational screening model targets for identifying the existence and level of the covariance between two or more variables (Karasar, 2002).

#### *Participants*

Second year students studying at six different departments of Faculty of Education at Akdeniz University in spring term of 2010-2011 academic year constitute the study group of the research. The research data were collected in two sessions. 196 students participated in the first session that was carried out for critical thinking data. Yet, a number of these students did not take part in the session in which the academic writing data were gathered. Some other students did the opposite of this. Hence, the students that participated in only one of these sessions were left out of the scope of the research. As a result, the number of participants of the research was determined to be 181. Departments and numbers of the participants have been illustrated in Table 1.

Table 1.

*Numbers and Departments of Participants*

<b>Department</b>	<b>n</b>
Science Education	23
Turkish Language Teaching	24
Social Studies Education	28
English Language Teaching	18
Preschool Education	38
Primary Education	50
<b>Total</b>	<b>181</b>

The reason for restricting the participants with second year students is that teacher candidates took the courses of *Turkish I: Written Expression* and *Turkish II: Oral Expression* in the first year, which is thought to have an indirect relationship to writing. No courses with a direct relationship to writing exist in the curricula of any of the departments except for Turkish Language Teaching in the second year. It was decided to conduct the research study on the students who took Turkish courses.

### *Instruments*

The research data were collected via two different instruments. The first one of these is the Watson-Glaser Critical Thinking Appraisal (WGCTA) developed by Watson and Glaser (1964). The scale was adapted to Turkish by Çıkırıkçı (1993). There are five subdimensions in the test involving a total of 100 items. These are the subdimensions of inference (20), recognition of assumptions (16), deduction (25), interpretation (24), and evaluation of arguments (15). With these subdimensions, the test can be applied to university students (Kaya, 1997).

It was found as a result of the validity and reliability studies of the scale adapted to Turkish on high school students that correlation coefficients regarding the internal consistency of subtests ranged between 0.56 and 0.57 (Kaya, 1997). As for the validity and reliability studies on university students, it was ascertained with these studies that correlation coefficients belonging to the internal consistency of subtests varied between 0.20 and 0.47. The correlation coefficient of the whole test was 0.63 (Çıkırıkçı, 1996). Kaya (1997) carried out calculations on the same scale for her own study, found that the correlation coefficient among subtests ranged between 0.24 and 0.73, and calculated the correlation coefficient of the whole test to be 0.73. This scale has been used in many research studies conducted in recent years (Tok and Sevinç, 2010; Deniz, 2009; Çekiç, 2007).

The second instrument employed for data collection involves the academic essays participants were asked to write. Academic writing criteria were used so as to evaluate the essays written by the participants. The criteria for academic writing were determined by referring to the literature (Zemach and Rumisek, 2005; Murray and Moore, 2006; Bailey, 2003) and through expert opinion. By this way, four key criteria required for an academic essay were identified. These criteria are *organization*, *content*, *word choice* and *language use*. After the content of these criteria were clarified, the essays written by the participants were evaluated by two experts. In order for qualitative data to be evaluated objectively in a study, it is essential to examine the correspondence between the scores given by two different scorers (Büyüköztürk et al., 2010). The percentage of the agreement between the experts who teach writing at universities, and have a doctoral degree in the relevant field of study and more than five years of experience was determined to be 88%. During evaluation of essays, each criterion was given 25 points, and the total score received from these criteria was regarded as the relevant participant's level of success.

### *Data Collection*

Collection of research data were carried out in two stages. The data concerning the WGCTA and levels of critical thinking were gathered first. After the necessary permissions were obtained, the scale was applied within lesson hours. All the participants voluntarily took part in the research. Participants were informed about the aim of the research and the scale. Items of the scale were answered in one session without interruption. The participants' completely answering the WGCTA consisting of 100 items lasted 90-120 minutes.

As for the writing data, they were collected a week after the application of the WGCTA. After getting expert opinion, participants were given a topic they would contemplate on as "How do you find the quality of education provided at university? Please write an academic essay of five paragraphs on your ideas about this issue." Thus, each participant was given a paper, pencil and eraser, and it was specified that they had an hour to complete the essays.

### *Analysis of Data*

The two different types of data were evaluated in two different ways. The data gathered from the WGCTA were analyzed via the statistics program. Means and standard deviations of the scores received from this scale were calculated according to its subdimensions. In order to determine whether participants' levels of critical thinking differ according to departments, one way analysis of variance was carried out. Subgroups are normally supposed to involve more than 30 people in parametric tests. However, Büyüköztürk (2010) claims that there are examinations indicating that in a large number of studies of social sciences, the use of parametric statistics did not lead to an important

deviation within the level of significance in the case that sizes of the subgroups were 15 or more. In addition, the fact that coefficients of skewness and kurtosis range between +1 and -1 shows that the assumption of normal distribution has been met. In the present study, participants' scores of critical thinking had a skewness coefficient of -200, and a kurtosis coefficient of -70 while the skewness coefficient was calculated to be -182, and the kurtosis coefficient was -264 for writing. These values indicate that there was a normal distribution.

Means and standard deviations of the scores participants got via academic essays were calculated. Furthermore, analysis of variance was carried out so as to understand whether writing success differ according to departments of participants. In order to find out which groups led to the difference, the Tukey test was used as a technique of post-hoc analysis.

The aim of the present research was to determine whether there is a significant relationship between prospective teachers' levels of critical thinking and levels of success in academic writing. Therefore, Pearson's correlation coefficients were calculated between participants' scores on levels of critical thinking and levels of writing. The gathered results have been illustrated below.

### **Findings**

In order to answer the first problem of the research, means of participants' scores on the scale of critical thinking were calculated according to departments. The results indicated that with a mean of 7.47, participants' of the Science Education Department had the highest mean score on the inference subdimension of the WGCTA while participants of the Social Studies Education Department obtained the lowest with a mean score of 6.82. Within the assumption subdimension, participants of the English Language Teaching Department were found to have the highest mean score with a mean of 10.38 whereas participants of the Social Studies Education Department got the lowest with a mean score of 8.71. For the deduction subdimension, participants of the Science Education Department exhibited the lowest mean score with a mean of 16.65, and participants of the Social Studies Education Department produced the lowest mean with a mean score of 15.67. As for the interpretation subdimension, participants of the Preschool Education Department had the highest mean with a mean score of 18.42 while participants of the Primary Education Department had a mean of 17.66, and obtained the lowest mean score on this subdimension. Whereas participants of the Science Education Department were found to have the highest mean score on the subdimension of evaluation of arguments with their mean of 9.04, participants of the Social Studies Education Department demonstrated the lowest mean score with a mean of 7.50. When all the scores received from the WGCTA were examined, it was found that participants of the English Language Teaching Department had the highest mean score with a mean of 61.77 while participants of the Social Studies Education Department got the lowest mean with a mean score of 56.57.

The aim of the first research problem was to identify whether prospective teachers' levels of critical thinking differ according to their departments. Hence, results of the analysis of variance conducted for this purpose have been displayed in Table 2:

Table 2.

*Results of Analysis of Variance Regarding Prospective Teachers' Levels of Critical Thinking According to Their Departments*

Critical Thinking	VK	KT	KO	Sd	F	p	$\eta^2$
Inference	Between-groups	60.886	12.177	5	2.061	.072	
	Within-group	1033.898	5.908	175			
	Total	1094.785		180			
Assumption	Between-groups	49.722	9.944	5	1.731	.130	
	Within-group	1005.295	5.745	175			
	Total	1005.017		180			
Deduction	Between-groups	21.110	4.222	5	.647	.664	
	Within-group	1141.752	6.524	175			
	Total	1162.862		180			
Interpretation	Between-groups	17.497	3.499	5	.556	.733	
	Within-group	1100.834	6.290	175			
	Total	1118.331		180			
Evaluation of Arguments	Between-groups	50.764	10.153	5	2.577	.028	.07
	Within-group	689.579	3.940	175			
	Total	740.343		180			
Total	Between-groups	470.458	94.092	5	2.295	.047	.06
	Within-group	7174.061	40.995	175			
	Total	7644.519		180			

As can be seen in Table 2, the scores on evaluation of arguments ( $F(5, 180)=2.2577$ ;  $p<.05$ ) and total scores ( $F(5,180)=2.295$ ;  $p<.05$ ) differ significantly based on the independent variable of department. In order to find out the source of difference based on the scores on evaluation of arguments and due to the homogeneity of variance, the Tukey test was applied as a multiple comparison (post hoc) test. Yet, when the effect size was calculated for the given difference, it was seen that the effect was small ( $\eta^2=.07$ ). Likewise, the Tukey test was implemented as a multiple comparison (post hoc) test in order to determine the source of difference based on total scores and because of the homogeneity of variance. However, when the effect size was calculated for the relevant difference, it was seen that the effect was small ( $\eta^2=.06$ )

Before proceeding with the solution of the second research problem, participants' mean scores on writing were calculated according to their departments. When the scores of writing success were examined based on this calculation, it was understood that participants of the Turkish Language Teaching Department had the highest mean score on the organization subdimension with a mean of 19.79 while participants of the Social Studies Education Department were found to have the lowest mean with a mean score of 16.07. Whereas participants of the Primary Education Department got the highest mean score on the content subdimension with a mean of 18.60, participants of the Social Studies Education Department exhibited the lowest mean with a mean score of 15.71. Within the subdimension of word choice, participants of the English Language Teaching Department demonstrated the highest mean score with a mean of 17.77, and participants of the Social Studies Education Department had the lowest with a mean score of 14.28. As for the subdimension of language use, participants of the English Language Teaching Department were found to have the highest mean score with a mean of 17.77 on this subdimension while participants of the Social Studies Education Department obtained the lowest with a mean score of 14.10. When total scores on levels of writing success were analyzed, it was seen that participants of the English Language Teaching Department got the highest mean score with a mean of 73.33 whereas participants of the Social Studies Education Department were found to have the lowest with a mean score of 60.17.

The aim of the second research problem was to find out whether prospective teachers' levels of writing success differ according to their departments. Results of the analysis of variance carried out for this purpose have been demonstrated in Table 3:

Table 3.

*Results of Analysis of Variance Regarding Prospective Teachers' Scores of Writing Success According to Their Departments*

Writing	VK	KT	KO	Sd	F	p	$\eta^2$
Organization	Between-groups	250.363	50.073	175	3.612	.004	.09
	Within-group	2425.880	13.862	180			
	Total	2676.243					
Content	Between-groups	226.027	45.205	5	3.951	.002	.10
	Within-group	2002.426	11.442	175			
	Total	2228.453		180			
Word Choice	Between-groups	256.288	51.258	5	4.614	.001	.11
	Within-group	1944.264	11.110	175			
	Total	2200.552		180			
Language Use	Between-groups	452.967	90.593	5	6.387	.000	.15
	Within-group	2482.392	14.185	175			
	Total	2935.359		180			
Total	Between-groups	4163.363	832.673	5	6.160	.000	.14
	Within-group	23656.526	135.180	175			
	Total	27819.890		180			

As illustrated in Table 3, participants' scores on all the subdimensions of academic writing and total scores differ significantly according to their departments. Results of the Dunnett's C test carried out due to the inhomogeneity of variances indicated that within the organization subdimension, the mean score obtained by participants of the Social Studies Education Department ( $X=16.07$ ) was significantly low compared to the mean scores of participants of the Turkish Language Teaching Department ( $X=19.79$ ) and the Preschool Education Department ( $X=19.21$ ). Within the content subdimension, participants of the Social Studies Education Department had a significantly low mean score ( $X=15.71$ ) in comparison with the mean scores of participants of the Primary Education Department ( $X=18.60$ ) and the Preschool Education Department ( $X=18.15$ ). As for the subdimension of word choice, the mean score participants of the Social Studies Education Department got on this subdimension ( $X=14.28$ ) was significantly low compared to the mean scores of participants of the Turkish Language Teaching Department ( $X=17.29$ ), the English Language Teaching Department ( $X=17.77$ ), the Preschool Education Department ( $X=16.57$ ) and the Primary Education Department ( $X=16.20$ ). Within the subdimension of language use, participants of the Science Education Department exhibited a significantly low mean score ( $X=14.13$ ) in comparison with the mean scores of participants of the Preschool Education Department ( $X=17.76$ ) and the Primary Education Department ( $X=17.70$ ). When the total scores on writing were examined, it was found that the scores belonging to participants of the Social Studies Education Department ( $X=60.17$ ) were significantly low compared to the scores belonging to participants of the Turkish Language Teaching Department ( $X=71.87$ ), the English Language Teaching Department ( $X=73.33$ ), the Preschool Education Department ( $X=71.71$ ) and the Primary Education Department ( $X=70.90$ ).

The aim of the third research problem was to determine whether there is a significant relationship between prospective teachers' levels of critical thinking and levels of writing success. Results of the calculations of Pearson's correlation coefficient have been indicated in Table 4:

Table 4.

*Relationships between Prospective Teachers' Levels of Writing Success and Levels of Critical Thinking*

	Organization	Content	Word Choice	Language Use	Total Score on writing
Inference	.337**	.332**	.448**	.446**	<b>.469**</b>
	.000	.000	.000	.000	<b>.000</b>
Assumption	.225**	.317**	.327**	.346**	.364**
	.002	.000	.000	.000	.000
Deduction	.398**	.262**	.366**	.258**	.384**
	.000	.000	.000	.000	.000
Interpretation	.308**	.343**	.378**	.371**	.419**
	.000	.000	.000	.000	.000
Evaluation of Arguments	.334**	.184*	.142	.176*	<b>.253**</b>
	.000	.013	.056	.018	<b>.000</b>
Total Score on Critical Thinking	.588**	<b>.534**</b>	<b>.622**</b>	.595**	<b>.702**</b>
	.000	<b>.000</b>	<b>.000</b>	.000	<b>.000</b>

\*  $p < 0.05$ , \*\* $p < 0.01$

According to Table 4, there is a positive and significant relationship of .702 ( $p < 0.01$ ) between participants' total scores on academic writing and their total scores on critical thinking. In addition, the highest relationship between the total score on academic writing and the subdimensions of critical thinking is within the subdimension of inference. A positive and significant relationship of .469 ( $p < 0.01$ ) was found between these two variables. With a positive and significant relationship of .253 ( $p < 0.01$ ), the lowest relationship between the total score on writing and the subdimensions of critical thinking is within the subdimension of evaluation of assumptions. Whereas the highest relationship between the total score on critical thinking and the subdimensions of writing is in the dimension of word choice with a positive and significant relationship of .622 ( $p < 0.01$ ), the lowest relationship is in the dimension of content with a positive and significant relationship of .534 ( $p < 0.01$ ).

### Conclusion, Discussion and Recommendations

The key finding of the present research is that there is a significant relationship between prospective teachers' levels of critical thinking and their success in academic writing. This finding may be based on the similarity of the requirements and functioning of critical thinking with the qualities needed for a good text. Dorn (1987; cited in Green and Klug, 1990) states that critical thinking is the process of logically deciding on what will be done and believed in. Thus, critical thinking requires such large-scale characteristics as being in search of the reasons for what to do, suspiciousness regarding others' beliefs, tendency to question evidence, and such large-scale values as being open-minded, establishing empathy, and being open to self-criticism as well as small-scale characteristics like having the skills of shedding light on cases, finding out the gaps and mistakes within a discussion, and determining latent assumptions in the discussion. All of these qualities are also essential characteristics for a successful academic essay. The intellectual base of the text will be equal to the writer's quality of thinking.

In a study conducted for determining the effect of discussion on critical thinking and writing, Green and Klug (1990) found that success in critical thinking and writing reinforce each other, and that these skills are transferable. The finding of the present research supports the finding of Green and Klug (1990). Accordingly, it is clear that critical thinking will be an effective means for developing the critical thinking skill when planned properly. The reason is that activities of academic writing give students the opportunity to define a problem, evaluate knowledge, understand concepts, apply knowledge, analyze cases or texts, synthesize ideas and communicate (Jablonski, 2004).

It was identified in the present study that prospective teachers' levels of critical thinking differ according to their departments, but this difference was not statistically significant. Korkmaz (2009) also ascertained in his study that departments of the participants did not affect their tendencies toward critical thinking. While Korkmaz's (2009) finding supports that of the present research, Genç (2008) reached a finding indicating that the level of critical thinking differ according to departments in another study.

Regarding the levels of critical thinking, it was found in the present research that students studying at the English Language Teaching Department and the Science Education Department got the highest mean score. Although there was not a statistically significant difference, the fact that students of these two departments reached a higher mean score was a remarkable point. The reason for students of the English Language Teaching Department getting a high mean score may be the fact that they have a good command of a second language. This qualification enables individuals to evaluate phenomena with a different perspective from a different culture. As for the Science Education Department, it is the program that is closest to positive sciences among the departments in terms of its curriculum. Memorization is one of the factors that obstruct critical thinking (Glasser, 2000). The natural science, which is based on understanding nature, is a field of study dealing with issues in the laboratory environment with activities hindering rote learning. However, it should be restated that this difference is not statistically significant. The scores obtained from the scale of critical thinking range between 56.57 and 61.77. This result indicates that prospective teachers have a medium level of critical thinking skills.

Among the participants, the most successful department in terms of the level of success in academic writing was English Language Teaching. This result is not surprising for two reasons. The first reason is that English Language Teaching is a language department, and that students studying at this department develop awareness in terms of all aspects a language. The second one is that the department in which academic writing is treated most intensively with its dimensions of content and form is again the English Language Teaching Department. Despite the fact that participants of the Turkish Language Teaching Department were successful in the organization subdimension, their total score was below that of the English Language Teaching Department. This difference in success backs up the finding of Bayat's (2009) study about the extent to which prospective English and Turkish language teachers use the criteria for academic writing in their essays.

Another finding of interest is that the Science Education Department, which ranked second in critical thinking, got the fifth rank in academic writing. This finding shows that although thinking is an essential precondition for writing, it cannot be sufficient on its own. Kazancı (1989) specifies thinking as a mental behavior. Yet, writing is an observable external behavior in a sense, and its quality is questioned depending on the structure of the written text. In other words, means of writing are different from those of thinking. Therefore, thinking well does not mean writing well by itself. It is thought that one of the reasons for participants of the Science Education Department being less successful than participants of the Turkish Language Teaching Department and the English Language Teaching Department within the subdimension of writing is their taking courses that are far from language activities but close to those requiring thinking due to their curriculum.

The Social Studies Education Department was found to be the least successful department in terms of the level of critical thinking and the level of success in academic writing. In a similar vein, Korkmaz (2009) ascertained in his study that the Social Studies Education Department had the lowest tendency within many dimensions of critical thinking. The reason for this may be related to the curriculum. The Social Studies Education Department maintains education with a program of several branches involving courses associated with history, geography, Turkish and pedagogy. This variety can be a factor that prevents focusing on and specializing in a specific subject. The Primary Education Department, which has the same variety, is the second least successful department after the Social Studies Education Department.

Among the subdimensions of critical thinking, the one that supports academic writing the most is inference. Inference is based on determining the latent assumptions in a certain expression. The individuals who can infer the assumptions oral and written messages are dependent on have a high level of language awareness. In this respect, it is an understandable finding that inference reinforces writing positively. As for the subdimension that reinforces writing the least, it is evaluation of arguments. This subdimension appears to be farther from language system compared to inference. Evaluation is a mental procedure carried out before expression.

It was ascertained that word choice is the subdimension that has the highest relationship to critical thinking, which can be regarded as one of the subdimensions of academic writing. In a written text, word choice is a prominent aspect for drawing the reader's attention to writing. The writers who choose appropriate and effective words are the ones that pay attention to reader characteristics. Thus, success in word choice is one of the indicators of the thinking skill. In the present research, the subdimension of academic writing that supported critical thinking the least was content. Within the texts written by the participants, the content dimension was limited with whether a thesis to defend existed, and whether this thesis was supported with subordinate ideas. On the other hand, whether a thesis and subordinate ideas exist or not is not directly related to critical thinking because critical thinking does not refer to the opinion or idea itself but the way it is produced.

Indicating the result that there is a significant relationship between prospective teachers' levels of critical thinking and their success in academic writing, the findings of the present research makes us think that the relationship between these two concepts should also be tested in more detail with other research studies. How thinking affects writing can be studied on individuals with different characteristics. It is obvious that writing activities will activate thinking. A well-structured writing plan can lead students to different ideas integrated with more causal links on the relevant topic. Hence, the relationship between these two concepts can be addressed from two different perspectives.

Findings of the research revealed that participants' levels of success in academic writing, and partly their levels of critical thinking differed for incidental reasons. For instance, while participants of the English Language Teaching Department were more successful in writing studies as a side effect of the area of expertise, participants of the Social Studies Education Department obtained less successful results. All the prospective teachers that will determine the quality of the society by educating people are supposed to be successful in thinking and writing. In this regard, more importance should be placed on courses and the other teaching activities that will ensure success in critical thinking and academic writing at faculties of education. In addition, before starting writing studies, students' thinking skills should be identified, and activities should be applied in order to develop these skills. It should be kept in mind that success in academic writing is possible provided that the faculties underlying this skill are developed.

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