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INVESTIGATION OF THE STUDIES RELATED TO WRITING ACTIVITIES FOR LEARNING PURPOSES IN SCIENCE EDUCATION ENVIRONMENTS IN TURKEY[i]

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Abstract:
When the national literature (Studies conducted in Turkey) is examined in recent years, it is noteworthy that the writing activities for learning purposes have started to be widely used in educational environments. The increased work in this area has also brought the need for compiling and reviewing the studies in the literature. For this purpose, in the study, firstly what is written for learning purposes and then its use in the educational environment is discussed in the light of academic studies. In the study conducted according to the descriptive method, the articles and theses in the indexed journals were scanned in databases such as Ebsco Host, Ulakbim, National Thesis Center of the Council of Higher Education and Google Academic. Between 2009 and 2017, a total of 33 scientific publications on writing to learn were included in the research. In the analysis through articles and theses reached: The purpose, teaching stages, type of research/data collection tools, methods and results used as an analysis unit. As a result, it was seen that the national field was mostly worked for similar purposes and similar results were achieved. These studies, which were mostly completed with quantitative research methods, showed that writing activities for learning purposes had positive effects on students' academic achievement, and sometimes positive and sometimes no effects on their attitudes.

Keywords: writing to learn, science education, document review

1. Introduction

In today's world, many areas are faced with rapid change and development. The society, which will keep up with these developments and changes, is ultimately difficult to raise individuals. This change inevitably necessitates individuals to renew themselves and keep up with change. To ensure that the individuals who make up the

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society keep up with these innovations and develop their talents; In short, it is possible to train individuals who can adapt to the requirements of the age through schools. From past to present, schools have been the institutions where this change and progress has been made.

It is noteworthy that many different methods are used to enable students to be active in their classroom environment and to be responsible for their learning. Animation assisted teaching method, cooperative learning method, discussion method, computer-assisted teaching method and writing to learn activities are the most important methods used to help to learn in the classroom. In particular, the effect of these methods on student achievement and attitude has been investigated and positive results have been obtained. Among these methods, the use of writing activities for learning purposes in the classroom has become widespread in Turkey recently and many studies have been the subject of research (Atila, 2009; Atila, Günel & Büyükkasap, 2010; Demirbağ, 2011; Günel, Uzoğlu & Büyükkasap, 2009; Uzoğlu, 2010; Yıldız, 2016).

Writing for the purpose of learning is first seen in the works of Emig (1977). While Emig (1977) describes learning as a unique way to learn, Langer and Applebee (1987) describe him as a tool that enables individuals to express their ideas more easily. Gere (1985) emphasizes that writing plays an important role in changing the thoughts of individuals. In addition, writing, such as metacognitive strategies (Özen & Durkan, 2018), such as writing, questioning, imagining, discovering and organizing knowledge, includes metacognitive strategies. On the other hand, writing is important in transforming basic ideas, making information consistent and regular (Rivard & Straw, 2000). Writing is not only a tool used in the structuring of information but also a communication and inquiry tool that enables thoughts to be delivered to different readers (Prain & Hand, 1996). Writing to learn as a learning tool rather than an assessment tool (Hand & Prain, 2002), can be considered a powerful tool to help students learn science (Levin and Wagner, 2006). Writing for learning purposes is a fact that individuals are very important for the development of individuals as they contribute to science learning and serve different functions. Hand et al. (1999) pointed out that the use of writing in science classes facilitated the study of different ideas by individuals, by integrating the preliminary information with the new concepts encountered, or by helping to integrate different concepts, to understand, think, and evaluate the claims about these concepts.

After Emig (1977) revealed the uniqueness of writing for learning purposes, it was tried to determine how writing contributed to learning in many studies. In these studies, different models related to writing to learn have been proposed. Beretier and Scardamalia (1987) proposed ''telling information'' and ''transforming knowledge'' models about writing for learning purposes. In the information telling model, the necessary information is retrieved from memory and converted into texts. According to the information transformation model, information transformation is mediated by an active problem solving. This requires an interaction between grammar = rhetoric and content knowledge. Although Beretier and Scardamalia's (1987) models of ''telling information'' and ''transforming knowledge'' have been highly accepted by scientists,

Galbraith (1999) also put forward another model for writing. These models of writing have been useful in understanding the cognitive implications during writing and understanding their relationship to learning.

In the following years, as the link between writing and learning is tried to be developed theoretically, experimental studies aiming to determine the effect of learning activities on learning are also found (Günel et al., 2006; Hand, Yang & Bruxvoort, 2007; Hohenshell, Hand & Staker, 2004; Klein, 1999, 2000, 2004; Kieft, Rijlaarsdam & Bergh, 2006; Kieft et al., 2007; Tynjala, 1998).

Research on the use of writing as a learning tool in science classes has increased in recent years (Günel et al., 2006). Writing activities used in science classes include book summary writing, taking notes, writing posters and laboratory reports. In addition, different types of writing as stories, letters, brochures, diaries, diagrams, poems, instructions, explanations, or the concept map are also used (Uzoglu, 2010). Test reports used in the laboratory environment are the most commonly used type of writing in the primary, secondary, high school ,and higher education institutions.

When the national literature is examined, it is seen that studies on writing to learn have been increasing. There was only one study on the study of writing for learning purposes in the national area (Günel, 2009). However, it is seen that this study sheds light on the development of writing to learn in international literature. Therefore, unlike the study, this study focused on national literature. It has been envisaged that educators and researchers should be able to help them to see the works carried out in the national field, and also to enable them to evaluate the various studies. The reason for the limitation of the study between 2009 and 2017 is that the studies on the national field have been given importance since 2009. This study was carried out for this purpose.

1.1 The Purpose of the Study

In accordance with the purpose of this study; In the studies related to writing for learning purposes, it is tried to determine which types of objectives are targeted, which kind of data collection tools are preferred, which kind of data collection tools are preferred, what kind of methods are preferred, what kind of data analysis methods are frequently used in the studies and what results have been reached in the studies examined.

2. Method

In this study, a document analysis technique which is widely used in historical and qualitative research is used. Document analysis is an analysis of any written material that gives information about the facts or facts that are aimed to be investigated (Ekiz, 2009; Şimşek & Yıldırım, 2011). In this study, scientific articles and theses were examined according to the criteria stated in the research question and the data were evaluated with descriptive analysis. Descriptive analysis is a technique that systematically emerges information that is written in printed and printed materials and

documents but is not systematically revealed. In the analysis, the data obtained are summarized, interpreted and even digitized under predetermined titles (Altunışık et al., 2012; Dawson, 2009, p.122, Akt: Özen, 2015). In this study, articles and theses: Aim, data collection, data collection, research type/data collection tools, methods and results are analyzed according to analysis unit ,and results are presented in tables together with frequencies.

The sample of the study is composed of studies on writing for learning purposes in the national field. The publications that make up the sample were obtained by scanning Ulakbim, Google Scholar, EBSCOhost and YÖK Thesis Center. The works were written in the paper and other fields were not included in this study. In order to reach the relevant publications in the determined databases, "writing to learn" keyword is used. The obtained articles were named as A1, A2 ... while the theses reached were coded as T1, T2 ... (Table 1).

Table 1: Used databases and keywords

Databases	Keyword	Articles-Theses
Google Scholar	Writing to learn	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17
Ulakbim		
Ebscohost		T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16
YÖK Thesis		

In this context, a total of 33 studies, including 17 articles, three doctoral theses and 13 master's thesis, were reached (Table 1). All texts are analyzed according to the selected analysis units, and the results are presented in tables in the findings section.

3. Findings

Studies in the national literature on writing to learn are examined according to their purposes are shown in Table 1.

Table 2: Classification of the studies (documents) according to their aims

Objectives	Studies (documents)	Frequency
To examine the effect of writing for learning purposes on student success	A1, A2, A3, A4, A5, A6, A7, A11, A13, A14, A15, A16, T1, T2, T3, T5, T6, T8, T9, T10, T11, T12, T13, T14, T15, T16	26
To determine the thoughts of teachers about writing	A12, A17, T4	3
To determine students' thoughts about writing for learning purposes	A10	1
To examine the effect of writing to learn on student attitude	T1, T7, T8	3
To investigate the effect of writing for	T6	1

learning purposes on students' cognitive skills		
Compilation of writing to learn studies	A6	1

When Table 2 is examined, it is seen that the effects of writing for learning purposes on student achievement (f = 26) are concentrated in national studies. On the other hand, studies were conducted in order to determine the opinions of teachers about writing (f = 3) and to examine the effect of students on student attitude (f = 3). In addition, it was observed that the students 'thoughts about writing for learning purposes (f = 1), the effect of writing to learn on students' cognitive skills (f = 1), and the compilation of learning purpose writing (f = 1).

The studies (writing) related to writing to learn in the national field are examined according to the selected sample groups and the results are shown in Table 3.

Table 3: Data collection level / Data source

Teaching level / Data source	Studies (documents)	Frequency
High School Students	A16, T3, T12, T15	4
Teacher candidates	A2, A4, A5, A10, T10, T11, T14	7
6th grade students	A1, A3, A15, T2, T5, T6, T7, T9, T16	9
4th grade students	A7	1
5th grade students	A13, T13	2
7th grade students	A14, T1, T2	3
8th grade students	T8	1
Teachers	A8, A12, A17, T4	4
Review the work carried out	A6	1
Document review	A9	1

When Table 3 is examined, it is seen that data gathered from students at the 6th grade level (f = 9) were frequently collected in studies related to writing for national purposes. In addition, it was understood that data were collected from prospective teachers (f = 7), teachers (f = 4), high school students (f = 4), 5th grade students (f = 2), 4th grade students (f = 1). Other studies, the examination of studies (f = 1), document examination (f = 1) is in the form.

Table 4 shows the study of nationally conducted studies on learning purposes according to data collection tools.

Table 4: Research type used in the studies and data collection tools

Type of research	Data collection tool	Studies (documents)	Frequency
Descriptive	Scale	T1, T8	2
	questionnaire	A1, A2, A5, A12, T4, T7, T8, T10, T14	9
Qualitative	Open-ended question	A4, A14, A15, T1, T9, T14, T16	7
	Interview	A1, A10, A11, A17, T4, T10, T12, T15, T16	9
	Literature review, document review	A6, A9, A11, T6, T7	5
	Observation	T15	1
Mixed (qualitative+ quantitative)		A2, A5, A8, T4, T12, T14, T15, T16	8

Experimental	A1, A2, A3, A4, A5, A7, A8, A13, A14, A15, A16, T1, T2, T3, T5, T6, T8, T9, T10, T11, T12, T13, T15, T16	24

When Table 4 is examined, it is seen that most studies are quasi-experimental studies with pretest-posttest design (f = 24). In addition, in descriptive studies, data were collected with questionnaire (f = 9) and scale (f = 2); in qualitative studies, it was determined that data collection tools such as interview (f = 9), open-ended question (f = 7), and observation (f = 1) were used. It was also found that mixed patterns were preferred in studies (f = 8).

The studies conducted in the national field related to writing to learn were examined according to data analysis methods and the results are shown in Table 5.

Table 5: Data analysis methods used in the studies examined

Studies (documents)	**Data analysis methods**
A1	Anova, Content Analysis
A2, T12	t-test, content analysis
A3, T2	Anova
A4	Anova, Post Hoc test
A5, T5	Anova, Content Analysis, t-test
A6, A8, A9, A10, A11, A17, T4, T7, T14	Content Analysis
A7, T13	t-test, Anova
A12	Descriptive statistics
A13, A15, T1, T3, T11, T15	t-test
A14	Content analysis, t-test, Kruskal Wallis
A16, T6	Mann Whitney U testi, t- testi
T8	Ancova, t-testi
T9, T10, T16	Ancova, Anova

When Table 5 is examined, it can be observed that the data analysis methods of the studies related to writing for national purposes have varied. The most used analysis method is the difference between the groups. Content analysis was used in qualitative studies.

When the studies are examined, it is revealed that learning activities for learning purposes increase student achievement and have a positive effect on their attitudes (A1, A2, A3, A4, A5, A7, A8, A13, A14, A15, A16, T1, T2, T3, T5, T6, T8, T9, T10, T11, T12, T13, T15, T16, etc.). In qualitative studies conducted with students, it is determined that writing develops their thinking skills, their ability to comment and their ability to express themselves (studies such as A6, A8, A9, A10, A11, A17, T4, T7, T14).

4. Results and Discussion

As a result of the research, it has been determined that studies on writing for learning purposes in the national field are concentrated on determining the effect of writing on student achievement. The results show that writing to learn has a positive effect on

learning (Eker & Coşkun, 2012; Günel, Uzoğlu & Büyükkasap, 2009; Günel, 2009; Günel, Atila & Büyükkasap, 2009; Günel, Memiş & Büyükkasap, 2009; Yıldız & Büyükkasap, 2011a; Yildiz & Buyukkasap, 2011b). While few studies on writing in the international field have a negative effect on learning (Klein, 1999), it has been determined that writing has a positive effect on learning in all national studies. On the other hand, to determine the thoughts of teachers about writing (Avcı & Akçay, 2013; Biber, 2012; Öztürk & Günel, 2015) to examine the effects of students' attitudes on learning (Atasoy, 2005; Bahadır, 2011; Baltacı, 2017). To determine the effect of writing for learning purposes on students' cognitive skills (Arlı, 2014), it was determined that there were studies such as compilation of learning purpose (Günel, 2009) but these studies were insufficient. It can be said that the number of students in the national field and the studies on determining the views of teachers on writing is less and insufficient compared to the studies conducted in the international field. For example, Klein (1999), in his study, will focus on the success of many studies. Hence, it can be said that there is a need for more studies in order to better determine the effect of writing on national success.

In addition, in the study, it was determined that the studies on writing in the national field were carried out more in the 6th grade according to the sample types (Akçay, Özyurt & Akçay, 2014; Arlı, 2014; Atasoy, 2005; Günel, Uzoğlu & Büyükkasap, 2009; Günel, Atilla & Büyükkasap; 2009; Öğdük, 2011; Özyurt, 2011; Uzoğlu, 2010). The reason for this is that there is no concern about the central examinations in the 6th grade. Teacher candidates (Günel, Memiş & Büyükkasap, 2009; Koçak, 2013; Sağırlı, 2010; Yeşildağ, 2009; Yıldız, 2009; Yıldız & Büyükkasap, 2011a; Yıldız & Büyükkkasap, 2011b), with the teachers Avcı and Akçay, 2013; Biber, 2012; Öztürk & Günel, 2015; Yıldız, 2011), high school students, 5th grade students, 4th grade students (Duymaz, 2011; Ozturk, 2014; Uzun, 2011; Uzun & Alev, 2013), reviewing the work done (Günel, 2009), document review (Yildiz , 2012).

It is noteworthy that there are few studies on 4th and 8th grades, especially in the national literature. The reason for the 8th grade in the eighth grade can be considered as having a TEOG (a national exam) exam in the 8th grade. Because the teachers are intensifying TEOG exam to prepare students for high schools. In this case, it can be thought that in the 8th grade, fewer studies can be done.

Another result of the study is the experimental study (pre-test-posttest applied) when the data obtained for data collection tools are analyzed (Akçay, Özyurt & Akçay, 2014; Arlı, 2014; Atila, 2009; Bahadır, 2011; Baltacı, 2017; Bozat, 2014; Bozat & Yildiz, 2015; Duymaz, 2011; Eker & Coskun, 2012; Gunel, Atila &Buyukkasap, 2009; Gunel, Uzoglu & Buyukkasap, 2009; Gunel, Kabatas Memis & Buyukkasap, 2009; Kabatas Memis, 2015; Koçak, 2013; Uzoğlu, 2010; Uzun, 2011; Uzun ve Alev, 2013; Öğdük, 2011; Özyurt, 2011; Öztürk, 2014; Yeşildağ, 2009; Yıldız & Büyükkkasap, 2011; Yıldız & Büyükkasap, 2011a; Büyükkas, 2011b). Studies in the survey (Atasoy, 2005; Bahadir, 2011; Biber, 2012; Günel, Uzoğlu & Büyükkasap, 2009; Öztürk & Günel, 2015; Yeşildağ, 2009; Yıldız, 2009; Yıldız & Büyükkkasap, 2011a; Yıldız & Büyükkasap, 2011b), (Yeşildağ, 2009; Günel, Uzoğlu & Büyükkasap, 2009; Sağırlı, 2010; Uzoğlu, 2010; Uzun,

2011; Duymaz, 2011; Biber, 2012; Avcı & Akçay, 2013; Yıldız, 2014), open-ended question, (Akçay, Özyurt & Akçay, 2014; Atila, 2009; Baltacı, 2017; Günel, Memiş & Büyükkasap, 2009; Kabataş Memiş, 2015, Uzoğlu, 2010; Yıldız, 2009), scale (Baltacı, 2017; Bahadır, 2011), & It is seen that data collection tools such as observation (Uzun, 2011) are used. An important point to note here is that observation is used as a data collection tool. However, when performing individual or group writing studies, it is important to ask the individuals to think aloud and observe their interactions with each other in terms of understanding the writing process (Riward & Straw, 2000). The reason why observation is not preferred as a data collection tool for writing may be factors such as recording of the observation, the length of the registration process and the difficulty of evaluation.

Quantitative studies of the most preferred method in the studies on writing for learning purposes in the national field (Akçay, Uzun ve Alev, 2013; Akçay, Özyurt & Akçay, 2014; Atila, 2009; Bozat, 2014; Arlı, 2014; Bozat & Yıldız, 2015 ; Eker & Coşkun, 2012; Günel, Uzoğlu & Büyükkasap, 2009; Günel, Atila & Büyükkasap, 2009; Bahadır, 2011; Günel, Kabataş Memiş & Büyükkasap, 2009; Kabataş Memiş, 2015; Koçak, 2013; Öğdük, 2011; Öztürk, 2014; Uzun, 2011; Yeşildağ, 2009; Yıldız, 2009; Yıldız and Büyükkkasap, 2011a; Yıldız & Büyükkasap, 2011b). On the other hand, it can be said that a significant number of the qualitative studies (Arlı, 2014; Atasoy, 2005; Avcı &Akçay, 2013; Günel, 2010; Sağırlı, 2010; Yıldız & Büyükkasap, 2011; Yıldız, 2012; Yıldız, 2014) corresponded to the qualitative studies. Qualitative and quantitative studies are also used together (Biber, 2012; Duymaz, 2011; Uzoglu, 2010; Uzun, 2011; Yildiz, 2009; Yildiz & Buyukkkasap, 2011a; Yildiz & Buyukkasap, 2011b; Yildiz & Buyukkasap, 2011c). On the other hand, only the number of quantitative studies is low (Günel, Atila & Büyükkasap, 2009; Öztürk & Günel, 2015). Based on these results, it can be said that the methods used in the studies vary widely.

Another result of the study is that data analysis methods vary. The most commonly used analysis methods t-test (Akçay, Özyurt & Akçay, 2014; Baltacı, 2017; Bozat & Yıldız, 2015; Koçak, 2013; Öztürk, 2014; Uzun, 2011) and content analysis (Atasoy, 2005; Avcı & Akçay) Biber, 2012; Günel, 2009; Sağırlı, 2010; Yıldız, 2009; Yıldız & Büyükkasap, 2011a; Yıldız, 2012; Yıldız, 2014). On the other hand, non-parametric tests have been preferred in studies.

5. Recommendations

1. It is seen that the effects of the studies conducted in the national field on the success and attitude of students are focused on. Especially, it is seen that studies on the cognitive processes during writing are insufficient. Efforts can be made to address this deficiency.
2. It is seen that the studies are concentrated at the middle school, high school, and university level while the primary school level is insufficient. Work can be done to eliminate this deficiency.

3. It is stated that the best and efficacy studies are qualitative and quantitative research, while studies on writing in the field are not sufficient from this point. Efforts can be made to address this deficiency.

References

Akçay, H., Özyurt, B. B., & Akçay, B. B. (2014). The effects of the use of multiple writing activities in science and technology teaching on student achievement and concept learning. *Bayburt Education Faculty Journal,* 9 (2), 15-31.

Altunışık, R., Çoşkun, R., Bayraktaroğlu, S. ve Yıldırım, E. (2012). *Research methods in social sciences.* 7. Edition, Sakarya Publishing.

Arlı, E. (2014). *The effect of argumentation based science learning approach (ATBO) on the academic achievement and thinking skills of disadvantaged students as seasonal agricultural workers.* Unpublished Master's Thesis. Atatürk University Institute of Educational Sciences. Erzurum.

Atasoy, E. (2005). *Use of writing in mathematics teaching.* Unpublished Master's Thesis. Karadeniz Technical University, Institute of Science and Technology, Trabzon.

Atila, M.E. (2009). *The effect of the use of different descriptive modes in learning activities on academic achievement in science teaching.* Unpublished Master's Thesis. Atatürk University Institute of Educational Sciences. Erzurum.

Atila, M.E., Günel, M. & Büyükkasap (2010). The effect of use modes of learning modes on the learning of elementary force and movement subjects of learning modes. *Turkish Journal of Science Education.* 7, 113-127.

Avcı, D. E., & Akçay, T. (2013). Teachers' views on writing activities in science and technology course. *Turkish Journal of Science Education*. 10 (2), 48-65.

Bahadir, E. (2011). *Investigation of the effects of the use of cooperative learning-based scientific letters on the attitude, success and scientific-literacy of the 8th grade states of matter and heat unit.* Unpublished Master's Thesis. Erzincan University Institute of Science and Technology, Erzincan.

Baltacı, A. (2017). *To evaluate the learning of astronomy by using multiple writing activities and information learning method by writing.* Unpublished Master's Thesis. Marmara University Institute of Educational Sciences. Istanbul.

Bereiter, C. & Scardamalia, M. (1987). *The psychology of written composition.* Hilsdale, NJ, New Jersey: Lawrence Erlbaum.

Bozat, Ö. (2014). *5. The effect of the letter on the success of writing activities in the electric unit in our class life.* Unpublished Master's Thesis. Atatürk University Educational Sciences Institute, Erzurum.

Bozat, Ö., & Yıldız, A. (2015). Effect of letter of writing activities on learning success in electrical unit in our 5th class life. Education Sciences, 10 (4): 291-304.

Demirbağ, M. (2011). *The effect of modal representation education on science achievement and*

writing skills in science classes using argumentation-based science learning approach. Unpublished Master's Thesis. Kırşehir University, Institute of Science and Technology, Kırşehir.

Duymaz, N. (2011). *Use of writing activities and learning analogy in learning cell subject.* Unpublished Master's Thesis. Marmara University, Institute of Educational Sciences, Ankara.Gere, A.R. (1985). Roots in the Sawdust: Writing to learn across the disciplines. Urbana, IL: NCTE.

Biber, B. (2012). *Science and technology teachers' perceptions of writing and application levels of writing activities for learning purposes.* Unpublished Master's Thesis. Atatürk University Institute of Educational Sciences. Erzurum.

Eker & Coskun. (2012). Effect of course diary writing on 4th grade students' academic achievement in social studies course. *Muğla Sıtkı Koçman University Journal of Institute of Social Sciences,* 29, 111-122.

Ekiz, D. (2009). Scientific research methods. Ankara: Anı publishing Emig, J. (1977). Writing as a mode of learning. *College Composition & Communication*, *28*, 122-128.

Galbraith, D. (1999). Writing as a knowledge-constituting process. In D. Galbraith and M. Torrance (Eds.), Knowing what to write: Conceptual processes in text production. Studies in Writing; 4 (139-160). Amsterdam: Amsterdam University Press.

Günel, M., Hand, B. & Gündüz, Ş. (2006). Comparing student understanding of quantum physics when embedding multimodal representations into two different writing formats: presentation format versus summary report format. *Science Education*, *90***,** 1092– 1112.

Günel, M., Atila, M.E. & Greater Health (2009). The effect of different description modes on learning-learning activities in the learning of the electric unit in our 6th grade life. *Primary Education Online Journal*. 8 (1), 183-199.

Günel, M., Kabataş-Memiş, E. & Büyükkasap, E. (2009). Investigation of the effects of learning activities and analogies on learning mechanical subjects at university level. *Gazi Faculty of Education Journal,* 29 (2), 401-419.

Günel, M., Uzoğlu, M. & Büyükkasap, E. (2009). The effect of learning writing activities on learning the subject of force at primary level. *Gazi Education Faculty Journal*, 29 (1) 379-399.

Günel (2009). Cognitive process and learning writing in primary science education. Elementary Education Online, 8 (1), 200-211, 2009. Hand, B. Prain, V. Lawrence, C. & Yore, L. D. (1999). A writing in science framework designed to enhance science literacy. *International journal of Science and Education*, 10, 1021-1035.

Hand, B. & Prain, V. (2002). Teachers implementing writing-to-learn strategies in junior secondary science: a case study. *Instructional Science Education*, *86*, 737–755.

Hand, B., Yang, O.E.M. & Bruxvoort, C. (2007). Using writing-to-learn science strategies to improve year 11 students' understandings of stoichiometry. *International Journal of Science and Mathematics Education*, *5*, 125-143.

Hohenshell, L., Hand, B. & Staker, J. (2004). Promoting conceptual understanding of biotechnology: writing to a younger audience. *The American Biology Teacher*, *6 6*(5) 333-338.

Kabatas Memis, E. (2014). The effect of 7th grade students using depiction modes to learn the in force and motion unit. *Cukurova University Faculty of Education Journal,* 44 (1), 23-40.

Kieft, M., Rijlaarsdam, G. & Bergh, H.B. (2006). Writing as a learning tool: testing the role of students' writing strategies. *European Journal of Psychology of Education,* 11(1) 17-34.

Kieft, M., Rijlaarsdam, G., Galbraith, D., & Bergh, H. (2007). The effects of adapting a writing course to students' writing strategies. *British Journal of Educational Psychology*, 77(3), 565-578.

Klein, P.D. (1999). Reopening inquiry into cognitive processes in writing-to-learn. *Educational Psychology Review*, 11, 203-270.

Klein, P.D. (2000). Elementary students' strategies for writing-to-learn science. *Cognition and Instruction,* 18, 317–348.

Klein, P.D, (2004). Constructing scientific explanations through writing. *Instructional Science*, *32*, 191–231.

Langer, J. A., and Applebee, A. N. (1987). *How writing shapes thinking: A study of teaching and learning*. Urbana, Ill.: National Council of Teachers of English.

Levin, T., & Wagner, T. (2006). In their own words: Understanding student conceptions of writing through their spontaneous metaphors in the science classroom. *Instructional Science, 34, 227–278.*

Mason, L. & Boscolo, P. (2000).Writing and conceptual change. What changes?. *Instructional Science*, *28*(3) 199 –226.

Öğdük, A. (2011). *The effect of the modal descriptions used in writing activities for learning purposes in science and technology course in the second stage of primary education.* Unpublished Master's Thesis. Atatürk University Institute of Educational Sciences. Erzurum.

Özen, F. (2015). Evaluation of the attitudes of teacher candidates towards democracy and multicultural education. *International Journal of Humanities and Education, 1*(2), 182-220. Web: http://dergipark.gov.tr/download/article-file/357548

Özen, F. & Durkan, E. (2018). The evaluation of the applications of the primary school teachers who use the metacognitive reading strategies in their classrooms: An example of Giresun province. *Turkish Studies, 13*(4), 519-550. Doi: 10.7827/TurkishStudies.12822.

Özturan Sağırlı, M. (2010). The examination of the educational effects of some writing activities in the light of student opinions. *Educatıonal Sciences: Theory & Practice, 10 (4).* 2521-2530.

Öztürk, S. (2014). *The effect of using high school-1 students on learning purposes in learning modal descriptions and effect on academic success in physics course waves unit.* Unpublished Master's Thesis. Atatürk University Institute of Educational Sciences. Erzurum.

Öztürk, B., & Günel, M. (2015). Using learning and writing for the purpose of learning from teacher perspective: measurement inventory development and pilot implementation. *Journal of Primary Education Online,* 14 (2), 713-733.

Özyurt, B. (2011). *Evaluation of the reproduction growth and development unit in living organisms by using multiple writing activities.* Unpublished Master's Thesis. Marmara University Institute of Educational Sciences. Istanbul.

Prain, V. & Hand, B. (1996). Writing for learning in the junior secondary science classroom: issues arising from a case study. *International Journal of Science Education, 18* (1), 117-128.

Rivard, L. P., & Straw, S.B. (2000). The effect of talk and writing on learning science: an exploratory study. *Science Education*, *84*, 566–593.

Tynjala, P. (1998). Writing as a tool for constructive learning: Students' learning experiences during an experiment. *Higher Education*, *36*, 209–23.

Uzoglu, M. (2010). *The aim of this course is to investigate the effects of using learning activities on learning power and matter unit at primary level*. PhD thesis, Atatürk University, Institute of Science and Technology.

Uzun, S. (2011). *The effect of learning-enriched learning environments on physical learning. An application at the energy level.* Unpublished PhD Thesis. Karadeniz Technical University, Institute of Educational Sciences, Trabzon.

Uzun, S., & Alev, N. (2013). The effect of enriched learning environments on learning achievement. *Turkish Journal of Science Education*, 10 (2), 138-154.

Yeşildağ, F. (2009). *Students' perception of multi-modal descriptions in modern physics teaching and the effect of learning process of writing activities prepared by modal descriptions on learning.* Unpublished Master's Thesis. Atatürk University Institute of Educational Sciences. Erzurum.

Şimşek, H., & Yıldırım, A. (2011). *Qualitative research methods in the social sciences.* Ankara: Seckin Publishing.

Yıldız, A. (2009). *Level of students' understanding of quantum physics subjects and effects of learning activities on academic success.* Unpublished PhD Thesis. Atatürk University, Institute of Science and Technology. Erzurum.

Yıldız, A. & Büyükkasap, E. (2011a). The level of understanding the photoelectric effect of teacher candidates and the effect of learning writing on success. *Journal of Educational Sciences in Theory and Practice.* 11 (4), 2259-2274.

Yıldız, A. & Büyükkasap, E. (2011b). The level of students' comprehension of Compton event and the effect of learning activities on academic achievement. *International Journal of Human Sciences*. 8, 1.

Yıldız, A. & Büyükkasap, E. (2011c). The level of students' understanding of the uncertainty principle and the effect of learning writing on academic achievement. *Tused. 8*(4). 134-148.

Yıldız, A. (2012). Letter as a writing to learn activity and the addressee. *MIJE, 2*(2), 1-10.

Yıldız, A. (2016). Discussion of the effects of writing activities on academic achievement in primary school. *Turkish Studies*. 14, 861-870.