



OPEN ACCESS

EURASIA Journal of Mathematics Science and Technology Education
ISSN: 1305-8223 (online) 1305-8215 (print)
2017 13(8):4471-4480
DOI: 10.12973/eurasia.2017.00941a



The Use of Fables in Science Laboratory

Hatice Kayhan

Cyprus International University, NORTHERN CYPRUS

Behbood Mohammadzadeh

Cyprus International University, NORTHERN CYPRUS

Sevilay Atmaca

Ankara, TURKEY

Received 1 January 2017 • Revised 1 March 2017 • Accepted 1 April 2017

ABSTRACT

In this study, undergraduate students were asked to construct fables which occurred in science laboratory. A fable is a type of story which mainly give moral lessons and put forward the principle of life. According to the directions, the students used “rules in laboratory”, “safety cautions”, “laboratory materials” and “first aid principles” in a correct manner. Research group were chosen from Department of Elementary School Education students. Students’ fables were marked with rubrics developed by the researchers. In the marking process, general qualifications of fables and basic principles of science laboratory were questioned in a correct manner. Data was examined by using “code and theme list” to “content analysis technique”. As a result, fables presented and information about their true values were focused on. This study is thought to make contributions in terms of the original contributions for researchers and teachers who are seeking innovations in science education and laboratory techniques in terms of the application.

Keywords: moral story, fables, creative writing, science and technology laboratory instructions

INTRODUCTION

There are a few cross-curricular studies on dram, poetry and science fiction stories (Kirk, 2009; Watts, 2001; Reis & Galvao, 2007) but the researchers in this study did not encounter any study on fables. With its broadest definition, fable is a short story where main characters are animals or plants and which aims to give a moral or life lesson. The word fable traces its roots to the Latin word “fabula” which means “story”. However, overtime, this word became the generic name for a short symbolic story type that is about a moral lesson or a code of conduct (Oğuzkan, 2006: 64). Fable is a type the roots of which traces back to very old times.

Science education is significant for contributing “to education enabling young generations to become responsible citizens and promote sustainable development in our world” (Eilks, 2015). According to Hodson science education aims “to equip students with the capacity and commitment to take appropriate, responsible and effective action on matters of social, economic, environmental and moral-ethical concern” (Hodson, 1998: 4). Achieving Science is the process of rethinking, re-understanding and reproducing the information. As a natural science discipline, life sciences help men to understand and reinterpret their environment. It is also the child’s

© **Authors.** Terms and conditions of Creative Commons Attribution 4.0 International (CC BY 4.0) apply.

Correspondence: Hatice Kayhan, *Cyprus International University, Northern Cyprus.*

✉ hdirek@ciu.edu.tr

State of the literature

- This study is significant for it aims to help students demonstrate their knowledge and skills they gained through “Science and Technology Laboratory Practices I” course through fables. * The study provides guidance for researchers and educators in search of new methods and interdisciplinary study examples regarding teaching of knowledge and skills expected to be gained in children’s literature or science laboratory.
- Science and Laboratory education improves creative thinking skills. Current study is important in terms of improving the creative thinking skills of students.

Contribution of this paper to the literature

- This study aims to teach students; the laboratory tools and instruments, rules to be followed in the laboratory and first aid rules to be followed in the laboratory by integrating imaginary and real incidents and using a tongue that is appealing to children.
- The texts used in this study are important in terms of emphasizing the significance of first aid.
- Laboratory accidents may be both man and environment induced. Texts written by students cover both of them.

education about the attractive and surprising environment around the child. It lays the groundwork to help the kid improve his/her creative thinking skills (Hancer, Sensoy and Yildirim: 2003). And one of the main environments that facilitate this process is Science and Technology laboratories. Laboratories are among the learning environments where learning takes place by doing and experiencing. Tobin argues that:

Teaching and learning can be viewed as forms of enculturation into a community of practice. Usually teaching and learning are considered to occur in classrooms, which can be regarded as evolving communities of practice in which the discursive practices (e.g., talk, writing, cognition, argumentation, and representation) of participants are constantly changing in response to the interactions of a teacher and students. (Tobin, 1998: 195)

While allowing the students to join science related activities, they also help students to make observations and generate ideas and eventually improve their skills (Boyuk, Demir and Erol: 2010). Toplis and Allen (2012) also argue that practice work in science education provides positive motivation for students and gives them an opportunity to use their skills.

The current study examines fables’ influence on student’s learning in the laboratory and their laboratory experiences. Fables were considered not only as a literary genre but also as a measurement of creative thinking and writing. As Carter highlights “creativity and cultural embedding are not the exclusive preserve of canonical texts but are pervasive throughout the most everyday uses of language” (Carter, 2004: 21). During the study, emphasis was placed on ensuring usage of real knowledge in the texts and this way, students’ knowledge levels regarding first aid in the laboratory were measured. This study, which was both fun and measured, learning levels of students, introduces a novelty to the field in that it gives an idea to the researchers carrying out interdisciplinary studies.

LIRETATURE REVIEW

Science education has advantages both for students and the science itself. When we involve our students in the learning process, in fact, we help our students to show their interest in science and express their own ideas science in order to conceive the natural world. Concerning the importance of conducting research on science Driver et al. highlight that:

A study of students’ understandings of the nature of science makes science itself the focus of enquiry. Such understandings would include an appreciation of the purposes of science, in seeking explanations of events in the natural world, and of the ways in which science functions as a social institution and

interacts with the wider culture, as well as an understanding of the nature and status of scientific knowledge. (Driver et al. 1996: 3)

Thus, it is crucial to incorporate cross-curricular topics in science education in order to help students understand the natural world. According to Luneeta et al. "knowledge of the natural sciences is constructed to explain objects, phenomena, and their interactions in the natural world" (Luneeta, 2007: 393). These kinds of activities will help students to make a rational relationship between science and society. In recent years, science education has changed and teachers are mainly using new and innovative method to teach science. In fact, "science education concerns itself with the sharing of scientific content and processes with other academic disciplines not traditionally related to the sciences" (Avwiri, 2016: 31)

In the past times people under oppressive rule, developed the habit of expressing their thoughts with stories about animals. The oldest and most interesting examples of fables are Panchatantra Fables. These fables are known to have been compiled in Kashmir in 200 B.C. In the subsequent centuries, these fables served as the source of fables by Aisopos and La Fontaine. Another famous piece of fable is the Kelile and Dimme fable written by Beydaba in A.D. 300. Also, Sheikh Saadi's work *Gülistan* from the Eastern literature, is important in that it contains numerous didactical and moral stories. On the other hand, the most first known fable writer in the West is Phrygian Aesop. Another prominent name who wrote numerous well known works in this area was Jean de La Fontaine who lived between 1621-1695. In the following centuries, British poet John Gay wrote numerous works in this category (Oğuzkan, 2006: 67). Fables also play an important role in the tales of the North American Indians with a considerable focus on animals (Kroeber, 2016).

The first examples of fables in our literature were seen in Seyhi's work named *Harname* written in 15th century. Later in 1862, in his book titled "*Tercüme-i Manzume*", Sinasi compiled poems by Western poets. In his work titled "*Kissadan Hisse*", Ahmet Mithat Efendi compiled translations he made from Aesop and La Fontaine as well as his own fables (Demirel, 2010: 171). Fables are not just short stories about plants or animals. These short stories that started with Aesop started serving as tools to criticize existing political leaders or governments, or the unfavourable direction of state of affairs in the country or to lead children to righteousness with numerous experiences. Especially the "take home message" of the fables serves this purpose. They also improves critical thinking, reflective thinking and creativity of the participants (Crenshaw, Hale, & Harper, 2011; Geertsen, 2003; Ness, 2015; Wallace, Berry, & Cave, 2009). Incorporating science related activities will enhance critical and reflective thinking among students. Forawi maintains that "integrating critical thinking with other competencies, like guided inquiry, experimenting, seeking evidence with support, teamwork and communication, are a few of the science-related skills which can easily be enhanced through the development of critical thinking skills (Forawi, 2016: 55)".

Thus, fables and short stories play an important role in children's education. Moving from this fact, the current study aims to teach children the laboratory tools and instruments that are based on scientific facts, rules to be followed in the laboratory and first aid rules using a tongue that is appealing to children and by making associations with real and unreal events. Incorporating cross-curricular topics in specially children's literature is crucial. Burnett and Myers maintain that:

In the children's worlds, literacy is broad, varied and offers choices. If literacy within school is framed by curriculum initiatives, literacy as presented by these children is framed by their relationships, interests and values. At a time when testing and target-setting have resulted in an increasingly objective-driven curriculum, it is particularly interesting to note children's enthusiasm for private writing. Engaged in such writing, children are released from expectations and fear of criticism and have space for creativity and expression. (Burnett & Myers, 2002: 61)

The didactic role and entertainment function of fables were taught with practical examples. While doing this, knowledge provided during laboratory courses previously was supported with stories written by children. In fact, "creativity seeks to understand the mental representations and processes underlying creative thought" ((Sternberg & Lubart, 1999: 8)

PROBLEM AND METHODOLOGY

This study is significant for it aims to help students demonstrate their knowledge and skills they gained through “Science and Technology Laboratory Practices I” course through fables. The study provides guidance for researchers and educators in search of new methods and interdisciplinary study examples regarding teaching of knowledge and skills expected to be gained in children’s literature or science laboratory. Science and Laboratory education improves creative thinking skill. Nickerson highlights that “creative people are people, it is said, who characteristically produce creative products” (Nickerson, 1999: 392).

Current study is important in terms of improving the creative thinking skills of students. Choosing the right instrument in these kinds of studies will help students to improve positive reactions. As Schwarz points out “self-reports of behaviours and attitudes are strongly influenced by features of the research instrument” (Schwarz, 1999: 93). Interdisciplinary studies are important in today’s world. Fables written by students are important in that they demonstrate students’ levels of learning of basic important rules to be followed in the laboratory. This study aims to teach students; the laboratory tools and instruments, rules to be followed in the laboratory and first aid rules to be followed in the laboratory by integrating imaginary and real incidents and using a tongue that is appealing to children. According to May:

Imagination, broadly defined, seems to me to be a principle in human life underlying even reason, for the rational functions, according to our definitions, can lead to understanding – can participate in the constituting of reality – only as they are creative. Creativity is thus involved in our every experience as we try to make meaning in our selfworld relationship. (May, 1975: 96)

The texts used in this study are important in terms of emphasizing the significance of first aid. Laboratory accidents may be both man and environment induced. Texts written by students cover both of them. The purpose of this study is to determine to what extent writing fables helps students studying Classroom Teaching at School of Education of International Cyprus University to use their knowledge and skills regarding the following gains from the Science and Technology Laboratory Practices I and II courses effectively:

- Learning about laboratory tools and instruments
- Knowing the rules to be followed in the laboratory
- Applying first aid in the laboratory

In this study which is designed as “Descriptive Research”, for the analysis of fables written by students, the method of content analysis via document analysis, which is a common method used in qualitative studies was employed.

Data analysis

Productions of students were divided into the following categories and themes by the researchers:

- Fables as a literary genre
- Functional features of fables
- Providing correct information about laboratory tools and instruments
- Mentioning rules to be followed in the laboratory
- Mentioning first aid practices in the laboratories

Moving from the body of literature and experiences of the researchers, a “fable assessment scale” was prepared. In this study, “coding based on predefined concepts” as defined by Strauss and Corbin (1990) was used. Unit of analysis was selected as “sentence or paragraph”. Document analysis encompasses the analysis of written material about the phenomena or phenomenon that are the target of the study (Yıldırım and Şimşek, 2000, 140). There are several studies that used document analysis as a method to analyse the meaning in the written material (Silman and Caglar, 2010; Engel and Ortloff, 2009; Piattoeva, 2009; Gannon, 2013; Solbrekke, Heggen and Engebretsen, 2014). The main goal of Content Analysis is to reach concepts and relations that can explain the data

collected and as a result, to group similar data around certain concepts and themes and to organize and interpret them in a manner easy to understand by the reader (Yıldırım and Şimşek, 2000, 162).

Classroom Teaching students created a total of 20 fable texts. 12 of these were included in the study as they had the required features of fable genre.

These properties were analysed in terms of two dimensions using the fable assessment scale:

- Fables as a literary genre,
- Functional properties of fables.

Science and Tech. Lab. Practices Dimensions of the scale were selected as;

- Providing correct information about laboratory tools and instruments
- Mentioning rules to be followed in the laboratory
- Mentioning first aid practices in the laboratories

All student productions covered in this study were assessed by both authors using this scale. For coder reliability, the formula developed by Miles and Huberman (1994) was used. The correlation of the coding by authors on the documents was found to have 95% consistency.

FINDINGS

In this study, Classroom Teaching students were asked to write fables based on what they learned in the Science and Technology Laboratory Practices I course. The students were instructed to use as they are; the “rules to be followed in the laboratory”, “safety measures”, “laboratory tools and instruments” and “first aid principles” in their stories which would all be experienced by a living being in the science and technology laboratory. The stories created by the students were assessed using the following criteria:

- Fables as a literary genre
- Functional features of fables
- Providing correct information about laboratory tools and instruments
- Mentioning rules to be followed in the laboratory
- Mentioning first aid practices in the laboratories

Fables as a Literary Genre

A fable is a literary genre where its animal and plant characters aim to give a lesson or advise or point a moral. Fables are made up of four parts. These are: introduction, rising action, denouement and the moral. In addition, lessons related to life are given to the reader via symbolic values. Here, selecting animals and plants as the characters of the story helps win the sympathy of the children and helps focus their attention to the moral lesson to be given. Within the context of these facts, a total of twenty fable texts were created by Classroom Teaching students. 12 of these were included in the study as they had the required features of fable genre. As an example of these features, the following student productions were used as they were:

Once in a far forest, there was a very naughty and reckless bee jumping from here to there. Despite feeding on the plants, this bee didn't care about harming them. Even though the Queen Bee warned this bee a couple of times, this naught bee continued to harm the plants.

.....

This way, the naught bee realized that harming the plants actually means harming himself. He apologized to the plants and never harmed the plants in the forest again. (The Naughty Bee)

The lizard and the ivy were two close friends. They spent their days dancing and playing and having fun. These two bodies who always found excuses not to go to school, suddenly got more interested in going to school after hearing that a laboratory was opened in their school. The lizard, who was a big fan

of this laboratory, spent most of his time inside the petri dish with his tale on his head or walking around the tubes. Disturbed by this, the ivy said to his friend:

--Dear lizard you spend most of your time in this lab and you don't play with me anymore.....

.....

And after this misfortunate event, the he decided to be more careful from then on. (Lizard and the Ivy)

These fables written by students, were both educatory and didactical in terms of the choice of characters and the message given to the reader. In that sense, fables have certain genre specific features such as giving advice and pointing a moral.

Functional Properties of Fables

Fables are unique in that they emphasize points, criticize, ironize and mention the right way (Demirel et al., 2010:173). In addition to contributing to language skills of children, fables they insemiate universal values in children such as love for nature, love for animals, being good, righteousness, industriousness, charitableness etc. In line with these facts, text examples from children's fables that attract attention in terms of functional properties are as follows:

This way, the naught bee realized that harming the plants actually means harming himself. He apologized to the plants and never harmed the plants in the forest again. (The Naughty Bee)

...Lion King told the children about the importance of being careful and avoiding waste during experiments. (Little Mistakes)

Nature is a whole with all the living creatures and plants it nests. Every living being that is part of this whole has a unique place in the ecosystem. In the texts above, emphasizing the importance of refraining from wasting nature's resources and the fact that harming nature actually means harming oneself, improves educatory functionality of explaining using a fable.

Providing correct information about laboratory tools and instruments

There are reasons for doing experiments in a laboratory. These can be outlined as; observing and explaining scientific elements in daily life, defining principles and rules regarding them, repeating the same phenomenon in more limited environments, and interpretation of results.

In the meantime, objects from real life as well as tools and instruments in their smaller versions or in slightly modified forms are used. Having correct knowledge about the functions of these tools and instruments, as well as being competent in their use are considered to be important both in terms of the safety of the living beings in the setting and in terms of ensuring the success of the work done. Among the important outcomes of this study is that correct information was provided about the laboratory tools and instruments used in the fables written by students. Below are some examples of texts with their original content obtained from this study:

"... Curious frog started spilling all across the laboratory the substance in a small bottle. After a while he felt a burning in his body and started to have difficulty breathing. Having seen this, The Wise Stork said: "What have you done? Don't you see the label on it?" and showed the label with "X" on it to the frog." (The End of the naughty mouse)

"... Let's cut a piece with the bistoury. Let's not touch it, we might damage the tissue. Let's remove it with the forceps. Bring a petri dish and let's put it in it...He has taken a tissue sample from the flower using a dissection needle and put it in a tube." (Serentenyum)

“...that’s how they stopped the frog. They said “a security guard from Anura team has been taken down!” and to remove all evidence they washed the whole place using washing bottle.” (The Path of the Adventurous Mouse)

These types of stories are important in that they teach children otherwise boring theoretical knowledge in a fun way. Also, these fables written by children are noteworthy in that they demonstrate their learning level related to the subject in question.

Mentioning rules to be followed in the laboratory

As they make use of the laboratory, candidate teachers get experienced as to how to design and carry out an experiment, and how to relate the experimental findings to theoretical knowledge. It can be said that a laboratory is one of the rare settings where theoretical knowledge and practical knowledge should be used simultaneously. Thus, it has different and unique rules compared to other educational environments. These rules should be determined based on the type (physics, chemistry, biology, basic science, instrumental analysis, radiology labs) of the laboratory, and experiences and limitations of the people using the labs. Basic rules can be outlined as; having knowledge of the tools and instruments used, how they are used and knowledge of the safety signs and symbols on them. The correct examples given in fable texts by candidate teachers related to the laboratory rules are as follows:

“... But the curious lizard always got himself into trouble. He saw a round glass (with sign on it saying “breaks easily”) and got into the glass. And the moment he got in the glass broke and piece of glass cut the tail of the lizard....And running to rescue the lizard, the Ivy said “Didn’t you see it could be dangerous?” and showed him the “breaks easily” symbol.” (Lizard and Ivy)

“...As the Curious Cactus moved towards where the “skull” sign was located, the older mouse said to him “Stop! There’s cancer risk there, you will die!” (The Path of the Adventurous Mouse)

What is noteworthy in texts written by children, is children’s perception as to the laboratory being a dangerous place. Most texts focus mainly on the problems that could be faced if safety rules were not followed.

Mentioning first aid practices in the laboratories

It is known that planning in advance and experience, being competent in use of lab tools and following lab rules strictly are highly correlated with lower accident risks in laboratories. However as shown by Hale (1984) with the accident probabilities equation, accidents maybe due to both humans and the environment. Having good grasp of basic first aid practices and sending the survivor to a healthcare facility as soon as possible may be lifesaving. Students were expected to mention the use of basic first aid practices in the laboratories in their fables and to reflect them appropriately with different fable elements. Examples were as follows:

“... the cat grabbed an object just to check it out but then he felt a warmth in his hand and put it back right away. His hand had burned badly. The dog called the mouse right away. The mouse looked at the object and there was “hot object’ warning on it. The mouse kept calm,...and cooled his hand under cold water. The mouse said, “lets’ take him to the hospital quickly, this was not a treatment, it was just first aid.”(Dog, cat and mouse.)

“...Maviş’s arm was bleeding badly. It was a huge cut. Karabas saw the “breaks easily” label on the tube. He took of Mavis’s jacket and covered the cut with it and pressed on it. Karabas said they had to go to the doctor as soon as possible. (End of curiosity)

“... He had just taken a sip when his throat started burning. The naughty cat was screaming in pain, and the Kangaroo Teacher rushed to help. Kangaroo Teacher didn’t make her vomit right away, or make her eat or drink something. They called the emergency line of the Veterinary right away. (Naughty Tarçın)

The narrations here are important in that they emphasize the importance of first aid in the laboratory. As mentioned above, laboratory accidents maybe caused both by men and by the environment. The texts created by

students in our study cover both of them. For instance, students drew attention to the malpractice where somebody drinks a hazardous liquid accidentally, he/she is forced to vomit instead of being taken to the hospital immediately. Another example from the texts is where it's noted that the right thing to do with cuts is to press on the cut with a cloth to stop bleeding. Both examples are important in terms of improving the functionality of the texts.

CONCLUSION

Starting from their birth, kids get equipped with knowledge that would prepare them for life. And children's literary works play a major role in that. Among such works, fables have a unique place in that they have a special part where a moral is emphasized with a take-home message. In cases where giving a lesson explicitly might be problematic, fables can be used effectively for that purpose.

The finding of the study is that candidate teachers are able to express the knowledge and skills they gained in "Science and Technology Laboratory Practices I" Course via fables. It was seen from the texts written by students that, they used their knowledge of children's literature such as "fables as a literary genre" and "functional properties of fables" effectively and they were able to associate "Providing correct information about laboratory tools and instruments", "Mentioning rules to be followed in the laboratory" and "Mentioning first aid practices in the laboratories" effectively with science and technology laboratory discipline. In fact, these kinds of activities "allow students to become knowledgeable by participating in and contributing to the life of their community, which has the potential to lead to lifelong participation and learning" (Rorth, W. & Lee, 2001: 264). On the whole, students learn a lot by working together and as Forwai points out "peer interaction in science activities is recognized as an essential feature that assists in developing critical thinking" (Forawi, 2016: 59). In this regard, it is believed that this study would serve as a guide to researchers and teachers in search of new methods and interdisciplinary study examples with regard to teaching knowledge and skills expected to be given in children's literature or science laboratory. Using these kinds of activities in science education encompasses "critical thinking and a plethora of other skills including, listening, researching, problem solving, reasoning, questioning, and communicating" (Scott, 2008: 40).

REFERENCES

- Avwiri, H. E. (2016). Emerging Trends in Science Education in a Dynamic Academic Environment. *Journal of Education and Practice*, 7(2), 31-38.
- Böyük, U., & Demir, S. (2010). Fen ve teknoloji dersi öğretmenlerinin laboratuvar çalışmalarına yönelik yeterli görüşlerinin farklı değişkenlere göre incelenmesi. *TUBAV Bilim Dergisi*, 4(3), 81-83.
- Burnett, C., & Myers, J. (2002) 'Beyond the frame': exploring children's literacy practices. *Reading*, 36(2), 56-62.
- Carter, R. (2004) *Language and Creativity*. London: Routledge.
- Crenshaw, P., Hale, E., & Harper, S. (2011). Producing intellectual labour in the classroom: the utilization of a critical thinking model to help students take command of their thinking. *Journal of College Teaching & Learning*, 8(7), 13-22.
- Driver, R., Leach, J., Millar, R., & Scott, P. (1996). *Young people's images of science*. Buckingham, England: Open University Press.
- Dorion, K. R. (2009). Science through drama: A multiple case exploration of the characteristics of drama activities used in secondary science lessons. *International Journal of Science Education*, 31(16), 2247-2270.
- Eilks, I. (2015). Science education and education for sustainable development-justifications, models, practices and perspectives. *Eurasia Journal of Mathematics, Science and Technology Education*, 11(1), 149-158.
- Engel, L. C., & Ortloff, D. H. (2009). From the local to the supranational: curriculum reform and the production of the ideal citizen in two federal systems, Germany and Spain, *Journal of Curriculum Studies*, 41(2), 179-198.
- Gannon, S. (2013). From a wonderful story to the no-nonsense facts: affect, knowledge and sexual citizenship in pedagogical texts for young children and their parents, *Sex Education*, 13(4), 371-382.
- Geertsen, H. R. (2003). Rethinking thinking about higher-level thinking. *Teaching Sociology*, 31, 1-19.

- Güleryüz, H. (2002) *Yaratıcı Çocuk Edebiyatı*. Ankara: Pegem Yayıncılık.
- Forawi, S. A. (2016). Standard-based science education and critical thinking. *Thinking Skills and Creativity*, 20, 52-62.
- Hale, A. (1984). Safety management for outdoor program leadership. Unpublished manuscript. In Camille J. Bunting, (2006). *Interdisciplinary teaching through outdoor education*. Newzeland: Human Kinetics.
- Hançer, H. H., Şensoy, Ö., & Yıldırım, H. İ. (2003). İlköğretimde çağdaş fen bilgisi öğretiminin önemi ve nasıl olması gerektiği üzerine bir değerlendirme. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, 1, 83.
- Hodson, D. (1998). *Teaching and learning science: Towards a personalized approach*. Buckingham, England: Open University Press.
- Lunnetta, V. N., Hofstein, A., & Clough, M. P. (2007). Learning and teaching in the school science laboratory: an analysis of research, theory and practice. In N. Lederman, & S. Abel (Eds.), *Handbook of research on science education* (pp. 393-441). Mahwah, N J: Lawrence Erlbaum.
- Halonen, J. S. (1995). Demystifying critical thinking. *Teaching of Psychology*, 22, 75-81.
- Karasar, N. (2006). *Bilimsel araştırma yöntemi*. Ankara: Nobel yayın dağıtım.
- Kroeber, A.L. (2016). Animal tales of the Eskimo, *The Journal of American Folklore*, 12(44), 17-23.
- Oğuzkan, F. (2006). *Çocuk Edebiyatı*. Ankara: Anı Yayıncılık.
- Miles, M. B., & Huberman, A. M. (1994). *An expended source book qualitative data analysis*. London: Sage Publication.
- May, R. (1975). *The courage to create*. New York: Norton.
- Nickerson, R. S. (1999). Enhancing creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp.392-430). New York: Cambridge University Press.
- Nelli, P. (2009). Citizenship and nationality in changing Europe: a comparative study of the aims of citizenship education in Russia and Finnish national education policy texts. *Journal of Curriculum Studies*, 41(6), 723-744.
- Ness, R. (2015). Promoting innovative thinking. *American Journal of Public Health*, 105, 114-118.
- Reis, P., & Galvão, C. (2007). Reflecting on Scientists' Activity Based on Science Fiction Stories Written by Secondary Students. *International Journal of Science Education*, 29(10), 1245-1260.
- Roth, W-M., & Lee, S. (2004). Science Education as/for Participation in the Community. 88(2), 263-291.
- Silman, F. & Çağlar, M. (2010). A Comparative overview of citizenship education in Cyprus. *International Review of Education*, 56(5-6), 671-682.
- Solbrekke, T. D, Heggen, K., & Engebretsen, E. (2014). Ambitions and responsibilities: A textual analysis of the Norwegian national curriculum regulations for nursing education. *Scandinavian Journal of Educational Research*, 58(4), 479-494.
- Strauss, A. & Corbin, J. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative Sociology*, 13(1), 3-21.
- Scott, S. (2008). Perceptions of students' learning critical thinking through debate in a technology classroom: a case study. *The Journal of Technology Studies*, 7(1), 39-44.
- Sternberg, R. J., & Lubart, T. I. (1999). The concept of creativity: Prospects and paradigms. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 3-15). New York: Cambridge University Press.
- Schwarz, N. (1999). Self-reports: How the questions shape the answers. *American Psychologist*, 54, 93-105.
- Tobin, K. (1998). 'Sociocultural perspectives on the teaching and learning of science', in M. Laroche, N. Bednarz and J. Garrison (Eds.) *Constructivism and Education*. Cambridge: Cambridge University Press, pp. 195-212.
- Toplis, R, & Allen, M. (2012). 'I do and I understand? Practical work and laboratory use in United Kingdom schools. *Eurasia Journal of Mathematics, Science and Technology Education*, 8(1), 3-9.
- Watts, M. (2001). Science and poetry: passion v. prescription in school science? *International Journal of Science Education*, 23(2), 197-208.
- Wallace, B., Berry, A., & Cave, D. (2009). *Teaching problem solving and thinking skills through science*. Abington, Oxon: Routledge.

<http://www.ejmste.com>