The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2023

Volume 31, Pages 17-25

ICRESS 2023: International Conference on Research in Education and Social Sciences

Analyzing the Documentary Film "Marie Curie" in terms of the Nature of Science Themes

Munise Seckin-Kapucu
Eskisehir Osmangazi University

Abstract: In this study, it was aimed to examine the documentary film "Marie Curie" in terms of NOS themes. The study was designed with qualitative research method. In this study, the documentary film titled "Marie Curie", which was produced in Poland, Germany, France in 2016 and had a viewing time of 1 hour and 35 minutes, was used as a data source. Content analysis was used to analyse the scenes in the documentary. As a result of the research, it was determined that four themes of the nature of science were emphasised in the documentary: These are: Scientific knowledge is influenced by the social and cultural environment during the development and transformation of scientific knowledge into practice, scientific knowledge can change, imagination and creativity have an important role in obtaining scientific knowledge, and scientific knowledge is subjective. As a result, this study has shown that there is a tool that can be used in teaching some NOS themes and concepts.

Keywords: Marie Curie, Documentary film, Nature of science, Content analysis

Introduction

In recent years, science has been defined based on the postmodern understanding of science, which is quite far from the positivist perspective. According to the postmodern understanding, science is a subjective human endeavor based on theory and culture, and experimental observations (Schwartz, 2004). It is stated that the elements that make up science are knowledge, scientific process skills and the nature of science (Demirbaş, 2016).

Being scientifically literate individuals is very important for societies in solving the economic, social and environmental problems of the twenty-first century in which the products of science and technology are rapidly involved in our lives (Eisenhar et al., 1996). Scientific literacy means that individuals can participate in an informed decision-making process involving issues related to daily life (DeBoer, 1991). Understanding the nature of science is seen as an important component of scientific literacy (Lederman, 2007).

The nature of science brings together fields of study such as history, sociology, psychology and philosophy of science and seeks answers to questions such as "what is science, how does it work, how do scientists work, what is the impact of social and cultural contexts on science?" (McComas & Olson, 2000).

When the literature is examined, different definitions of science and NOS are encountered due to the multifaceted, complex and dynamic nature of science. For this reason, there is no consensus among philosophers of science, historians of science and science educators regarding the understanding of NOS (Demirbaş, 2016). However, some researchers have reached a consensus on some features of NOS (Abd-El-Khalick et al., 1998; Lederman et al., 2002; Smith et al., 1997; Smith & Scharman, 1999). Scientists working on the nature of science have developed different methods for teaching the nature of science. These are: the changeable nature of science, scientific knowledge based on evidence obtained from experiments and observations, subjectivity of

- This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

- Selection and peer-review under responsibility of the Organizing Committee of the Conference

© 2023 Published by ISRES Publishing: www.isres.org

scientific knowledge, creative nature of scientific knowledge, observations, inferences and theoretical topics in science, social and cultural structure of scientific knowledge, scientific theories and laws (Doğan et al., 2012).

These can be explained as follows:

- Scientific knowledge is changeable (Abd-El-Khalick, 2001; Lederman et al., 2002) because science is a continuous process that seeks to uncover truths. Scientists check, test and improve the knowledge they acquire through experiments, observations and other investigations. At the end of this process, scientists may obtain new knowledge or more accurate knowledge. For example, as a result of their research, scientists may find that a previously accepted theory is invalid or incomplete. In this case, scientists change the old theory or develop a new one. Knowledge is thus corrected or completed over time.
- Science is based on knowledge obtained through experimentation and observation. Experiments and observations are conducted to formulate a scientific hypothesis, and experiments and observations are used to verify the truth or falsity of the hypothesis.
- Science tries to be obtained in an objective and objective way. Subjectivity is tried to be avoided during the processes carried out in science. However, any research cannot be completely free of subjectivity, since it is people who actually conduct scientific research (Lederman, 2007).
- Creativity and imagination play an important role in the creation of scientific knowledge. Imagination enables scientists to use existing knowledge to formulate new and unpredictable hypotheses and conduct research. When new hypotheses are formulated, they need to be verified by experiments or observations. However, imagination is needed to develop new ideas and formulate new hypotheses.
- Observation and inference are two basic methods used in science. Observation is a method used to conduct experiments, observe events and phenomena and collect data. Inference is the process of obtaining meaningful results after analyzing the data obtained (Lederman, 2007).
- The social and cultural environment has an impact on the development of scientific knowledge and its transformation into practice. Science is done according to the needs and interests of society, and the place of scientists in society, their access to knowledge and the opportunities to conduct research depend on their cultural and social environment.
- Laws and theories are different scientific knowledge. While laws are generalizations about observed natural phenomena, theories are explanations of these generalizations (Abd-ElKhalick et al., 1998). Theories and laws are different scientific knowledge.

When the literature on science and the nature of science is examined, it is seen that there are different perspectives on what scientific knowledge is, how scientific knowledge is constructed and how science should be taught (Köseoğlu et al., 2008). In recent years, three approaches to teaching have been put forward: historical, indirect and open-thinking approaches (Abd-El-Khalick & Lederman, 2000; Khishfe & Abd-ElKhalick, 2002; Irwin, 2000). The historical approach examines the development of science and its production processes (Demirbas, 2013). This enables students to learn the history of science and empathize with scientists; to realize the humanistic dimension of science, that scientific processes do not only consist of experimental results, that the development of science does not always proceed in a linear line and that fluctuations occur in history (Demirbas, 2013). This approach also enables students to explore the development of scientific theories in the social and cultural context of the relevant historical period (Gooday et al., 2008; Koseoglu et al., 2008; Mathews, 1994). According to Irwin (2000), events in the history of science reveal the importance of scientific knowledge. Therefore, explaining the history of science to students can arouse curiosity and excitement in them and help them comprehend the nature of science. In this approach, in order for students to learn about the nature of science, discussions about how scientists do science under which conditions are brought into the classroom environment. In the indirect approach, it is argued that when students participate in scientific activities such as inquiry-research or science process skills-oriented teaching, their understanding of the nature of science will progress spontaneously (Abd-El-Khalick, 2002; Lawson, 1982; McComas et al., 2002; McComas, 1993; McComas, 1998; Moss et al., 1998). Which of these approaches can be more effective in teaching NOS is one of the issues that science educators are still debating.

In the modern age we live in, animated movies are one of the most important visual and auditory educational elements used in the field of education (Kurtdas, 2021). Films reflect the social and cultural conditions of the period in which they were produced and the current situation they are in (Turan, 2022). There are some points to be considered in the process of using films, which started to be used for educational purposes shortly after the invention of the film camera (Kurtdas, 2021), for educational purposes. These are factors such as the subject of the movie, the choice of actors, and the quality of the message given in the movies (Kurtdas, 2021). As a result of the studies, it was concluded that movies are a "powerful educational tool" and that watching a movie even once causes measurable attitude change (Kurtdas, 2021).

Recently, various researches and experiments have been intensifying on the use of popular movies and TV series, which are not prepared for courses but appeal to the general audience, as an educational material in education (Bascı, 2020; Demmit, 1998; Gladding, 1994; McCullick et al., 2003; Nadir, 2013; Navakanesh et al., 2019; Yıldırım et al., 2015). Although the use of films as educational tools is not a common situation, it can be said that some film genres are more prioritized for educational purposes. Among these genres, documentaries, propaganda films and cartoons come first (Kurtdas, 2021). Documentaries are among the most effective genres that can be used for educational purposes because they carry more message concerns and formatting purposes than other types of films (Kurtdaş, 2021). One of the most important reasons why movies and especially documentaries are effective is that new generations are very familiar with visual media (Alvarez et al., 2004). However, students encounter many abstract concepts in different courses that are far from visualization. This makes it difficult for students to concretize abstract concepts (Taber, 2002). One of these courses is science. Documentaries, which are an effective type of movies, can be used in teaching abstract concepts in this course. In the literature, there are studies on films and film genres in the field of science education (Baskalyoncu, 2017; Dark, 2005; Efthimiou & Llewellyn, 2006, 2007; Piliouras et al., 2011; Kapucu et al., 2015).

In our developing world, it can be said that quality movies will be an important informal teaching tool in providing a conscious perspective on science. For this reason, it is necessary to increase the number of studies on TV series, documentaries and feature films that contain topics related to science, which is a part of our daily lives (Yılmaz, 2018). In this study, it was aimed to analyze the documentary film "Marie Curie" in terms of NOS themes.

Method

Research Design

The study was designed with qualitative research method and document analysis was used. Document review is defined as the process of obtaining, reviewing, questioning and analysing various documents that are described as sources in the research (Ozkan, 2021). Document analysis is a systematic process used to analyse printed or electronic materials (Bowen, 2009). Electronic materials such as films, videos and photographs can also be used in qualitative research (Merriam, 2009). In this study, films were used as document type.

Data Sources

The documentary film titled "Marie Curie", which was used as a data source in this study, was produced in Poland, Germany, France in 2016 and the duration of the film was 1 hour and 35 minutes. The director of the movie was Marie Noelle and the screenwriter was Marie Noelle. The movie is about the life of Marie Curie, the first and only scientist to be awarded the Nobel Prize in two different fields. In the movie, the concepts of thorium, radium, radiation, radioactivity, Nobel Prize, helium, lead, electromagnetism, uranium are mentioned.

Figure1. An image related to the movie Marie Curie (Pokromski & Noelle, 2016)

Data Analysis

Document review was carried out in five stages: accessing the documents, checking their authenticity, understanding the documents, analyzing the data and using the data (Forster, 2006). When documents constitute the entire data set of a research, it is stated that it is necessary to subject the documents to content analysis in line with the purpose of the research (Simsek & Yıldırım, 2021). Therefore, content analysis was used to analyze the documents.

Results and Discussion

The film Marie Curie was analyzed in terms of the themes of the nature of science (scientific knowledge is influenced by the social and cultural environment during its development and transformation into practice, scientific knowledge can change, imagination and creativity have an important role in obtaining scientific knowledge, scientific knowledge is subjective). This information obtained from the analysis results is presented in this section (Table 1).

Table 1. Analysis of the movie Marie Curie in terms of the themes of the nature of science

Nature of Science Theme	Time	Content	Description
Scientific knowledge is influenced by the social and cultural environment.	3.15-3.23	- Can horses win Nobel prizes? - No, only men can get it. Your mother is an exception. She's the first lady to win the Nobel Prize. - Then I'll be the second me. - Sure, why not?	The fact that the Nobel Prize was awarded only to men and Marie Curie was an exception shows that scientific knowledge is clearly influenced by the social and cultural environment.
	22.15-22.25	- You can do it in Poland. - What future will my daughters have in Poland? - What are you talking about? Poland is at the beginning of big changes. Your girls will be better off there than in a country that has never given Dreyfus his rights.	In this scene, Marie Curie thinks that her children will not have a good future in Poland, a newly independent country. This situation can be shown as an example that science is under the influence of social and cultural environment.
	30.03-30.14	- Does Madame Curie also teach at the Sorbonne? - Radium may be the latest fashion, but a woman professor will never be.	Here, it is emphasized that Mrs. Curie should not have been a professor at the university just because she was a woman, no matter how important her achievements were. From this point of view, we see that social and cultural elements affect scientific knowledge.
	01.06.00 01.06.12	- You can learn to convince them. - Back to reality. They won't admit a dirty Pole to the French academy. - You have done much more for France than those so-called patriots. - All this political intrigue behind the scenes...	Here we see Mrs. Curie complaining that she would not be accepted into the French academy just because she was Polish. Based on this complaint, we see that scientific knowledge is influenced by cultural and social elements.

	01.16.10 01.16.25	- We all know very well that Madame Curie could not have achieved these results on her own. - No woman could have done it. - This woman is a visionary!	It is stated here that Madame Curie is a woman and cannot come to a conclusion alone. And it is stated that no woman can do this either. As seen here, scientific knowledge is under the influence of social and cultural environment.
	01.15.09 01.15.25	- You think the French people don't want to know that the highest honor of the state is given to a woman who commits adultery? And she's Jewish. - Is he Jewish? As far as I know, he's not Jewish. If you want to fight, you have to offer a little more than his so-called Jewish origins.	Here we see that Marie Curie's private life was used and slandered to prevent her from receiving the Nobel Prize. From this point of view, we can say that the social and cultural environment is very important in the development of science.
	01.29.21 01.29.43	- We have prepared a statement announcing that you have voluntarily renounced the Nobel Prize, at least until this affair with Langevin blows over. It's the most elegant ending for everyone. - The award was given to me for my discovery of radium. A scientist's achievements have nothing to do with his private life. - The European press has been writing about your immorality for weeks. - Because I'm a woman. If you wanted to exclude every male scientist who had a secret affair, you couldn't find anyone to give the Nobel Prize to.	Here they are not interested in Madame Curie's discoveries, they are saying that she could not have won the Nobel Prize because of what happened in her private life. And they do this only because she was a woman.
	30.36- 31.03	- I don't like today's education system at all. Children should have time for sports to develop artistic sensitivity and you know well that nothing stimulates curiosity more than experimentation. But no! They force them into rote memorization, hopeless tricks. And they forbid girls to attend any physics classes. even if they're as gifted as Irene. - And you're going to find a cure for all this? - Yes, if necessary.	In this scene there is a plea to today's education system.
Scientific knowledge can change.	04.38- 04.53	- After Henry Becquerel had discovered the special light-emitting properties of uranium, Mrs. Curie proved that thorium and its constituents had the same properties and called these substances radioactive.	Here, after Henry Becquerel's discoveries, Ms. Curie added her own observations and reached a new substance. In other words, scientific knowledge changes and develops.
	02.14- 02.30	- As you can see, Thorium does not emit significant amounts of radiation. The emission of a particular element following a pattern of trajectories can vary.	While thorium has so far shown no significant amount of radiation, this could change with the emission of a specific element. So we see that scientific knowledge is subject to change.
	36.03- 36.21	- As Pierre Curie explained in his last lecture, the progress made in physics in the last 10 years has turned our perception of electromagnetism or matter upside down. As	The progress made in the field of physics in the last 10 years has changed the known knowledge. From this point of

		for the new discoveries in the chemistry of radioactive matter, we can only guess.	view, we see that scientific knowledge is changing every day in ways that we cannot predict.
Scientific knowledge is open to the influence of imagination and creativity.	09.29-09.56	- Our radium. It glows from within. - A healing agent in a state of inner turmoil. Either there's a demon inside or the atom is indivisible! - That would contradict all known theories.	Mrs. Curie said that the element radium radiates from within and that it is a healing substance. This shows that imagination and creativity play an important role in achieving scientific knowledge.
	43.10-43.35	- Are you asking me how new ideas are born? - Yes. - It's a very exciting question, but the answer is far beyond the limits of physics. As with everything else, you have to rely on your intuition and common sense. Many scientific discoveries are a mixture of talent and coincidence.	Here, it is necessary to rely on common sense and intuition in the formation of new ideas Creativity is necessary in the development of new ideas.
Scientific knowledge is subjective.	05.24-05.40	- Check it out! The Times doubts that radium is an element. - Quiet! Radium is not a combination of helium and lead, as our distinguished colleagues claim. Mrs. Curie and I believe the new discovery will do more good than harm.	While the Times doubted that radium was an element, Mr. and Mrs. Curie believed that radium could be useful in many ways. This shows that the same physical phenomena can be subjectively explained in different ways by different scientists.

When analysed in terms of the themes of the nature of science in the film, it is mostly seen that scientific knowledge is influenced by the social and cultural environment during the development and transformation of scientific knowledge into practice (8 scenes). This theme was followed by scenes related to the fact that scientific knowledge can change (3 scenes), that creativity is used in the process of obtaining scientific knowledge (2 scenes) and that it is subjective (1 scene). In the film, the nature of science theme that scientific knowledge is influenced by the social and cultural environment was predominantly emphasised.

Conclusion

As a result of the research, it was determined that five NOS themes were emphasised in the documentary: These are: Scientific knowledge is variable; it contains logical, mathematical and experimental inferences; it is subjective; it is open to the influence of imagination and creativity; and it is influenced by the social and cultural environment. In the film, emphasis on the nature of science theme that scientific knowledge is affected by the social and cultural environment was found. The reason for this is that in the film, how Marie Curie was affected by the taboos of the period in which she lived as a woman scientist and what she experienced due to these taboos were covered in detail. Marie Curie is a scientist working on radioactivity. For this reason, the film can be used in science education. In the literature, there are studies on the nature of science (Baskalyoncu, 2017; Kapucu et al., 2015). The results of these studies overlap with the findings of the current study. As a result, this study has shown that it is a tool that can be used in teaching some NOS themes and concepts. Therefore, the documentary film "Marie Curie" examined in this study can be used as a tool for teaching NOS themes at various grade levels and in science courses. Studies can be planned in this direction.

Recommendations

The documentary film "Marie Curie" examined in this study can be used as a tool for teaching NOS themes at various grade levels and in science courses. In addition, other films with scientific concepts can also be examined and studies on NOS and concept teaching can be planned.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

Acknowledgements or Notes

* This article was presented as an oral presentation at the International Conference on Research in Education and Social Sciences (www.icress.net) held in Budapest/Hungary on July 06-09, 2023

References

Abd-El-Khalick, F. (2001). Embedding nature of science instruction in preservice elementary science courses: Abandoning scientism, but. *Journal of Science Teacher Education*, *12*(3), 215-233.

Abd-El-Khalick, F., & Lederman, N.G. (2000). The influence of history of science courses on students' views of nature of science. *Journal of Research in Science Teaching*, *37*, 1057- 1095.

Abd-El-Khalick, F., (2002). Rutherford's enlarged: A content-embedded activity to teach about nature of science. *Physics Education*, *37*(1), 64-68.

Abd-El-Khalick, F., Bell, R. L., & Lederman, N. G. (1998). The nature of science and instructional practice: Making the unnatural natural. *Science Education*, *82*(4), 417-436.

Alvarez, J. L., Miller, P., Levy, J., & Svejenova, S. (2004). Journeys to the self: Using movie directors in the classroom. *Journal of Management Education*, *28*(3), 335-355.

American Association for the Advancement of Science (AAAS). (1993). *Project 2061: Benchmarks for Scientific Literacy*. New York, NY: Oxford University Press.

Bascı, S. (2020). *Analysis of the character-space integrity that shapes the interior space design in science fiction cinema through Star Wars film* (Master's thesis). Mimar Sinan Guzel Sanatlar University, Istanbul.

Baskalyoncu, H. (2017). *The effects of documentary films of historical science in the teaching of the nature of science and the particulate nature of matter* (Master's thesis), Abant Izzet Baysal University, Bolu.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27-40.

Dark, M. (2005). Using science fiction movies in introductory physics. *The Physics Teacher*, *43*, 463-465.

DeBoer, G. E. (1991). *A history of ideas in science education*. New York, NY: Teachers College Press.

Demirbas, M. (2016). *Fen bilimleri ogretiminde bilimin dogası*. Ankara: Pegem Akademi.

Demirbas, M. (Ed.) (2013). *Bilimin dogası ve ogretimi*. Ankara: Pegem Akademi

Demmitt, A. D. (1998). Using literature to teach the art of diagnosing. *The Family Journal*, *6*(2), 147-149.

Dogan, N., Cakıroglu, J., Bilican, K., & Cavus S. (2012). *Bilimin dogası ve ogretimi*. Ankara: Pegem Akademi

Efthimiou, C. J., & Llewellyn, R. A. (2006). Avatars of Hollywood in physical science. *The Physics Teacher*, *44*, 28-33.

Efthimiou, C. J., & Llewellyn, R. A. (2007). Cinema, Fermi problems, and general education. *Physics Education*, *42*, 253-261.

Eisenhart, M., Finkel, E., & Marion, S. F. (1996). Creating conditions for scientific literacy: A examination. *American Educational Research Journal*, *33*, 261-295.

Forster, N. S. (2006). *The analysis of company documentation*. *Documentary research* (pp. 83-106). SAGE Publications.

Gladding, S. T. (1994). Teaching family counseling through the use of fiction. *Counselor Education and Supervision*, *33*(3), 191-200.

Gooday, G., Lynch, J. M., Wilson, K. G., & Barsky C. K. (2008). Does science education need the history of science?. *The History of Science Society*, *99*.

Irwin, A. R. (2000). Historical case studies: Teaching the nature of science in context. *Science Education*, *84*(1), 5-26.

Kapucu, M. S. (2016). An examination of the documentary film" Einstein and Eddington" in terms of nature of science themes, philosophical movements, and concepts. *International Journal of Progressive Education*, *12*(2), 34-46.

Kapucu, M. S., Cakmakci, G., & Aydogdu, C. (2015). The influence of documentary films on 8th grade students' views about nature of science. *Educational Sciences: Theory & Practice*, *15*(3), 797-808,

Khishfe, R., & Abd-El-Khalick, F. (2002). Influence of explicit and reflective versus implicit inquiry-oriented instruction on sixth graders' views of nature of science. *Journal of Research in Science Teaching, 39*(7), 551-578.

Koseoglu, F., Tumay, H., & Budak, E. (2008). Bilimin dogası hakkında paradigma degisimleri ve ogretimi ile ilgili yeni anlayıslar. *Gazi Universitesi Gazi Egitim Fakultesi Dergisi, 28*(2) , 221-235.

Kurtdas, E. M. (2021). Egitimde film kullanımının onemi. *Mehmet Akif Ersoy Universitesi Egitim Fakultesi Dergisi*, (60), 222-244.

Lawson, A. E. (1982). The nature of advanced reasoning and science instruction. *Journal of Research in Science Teaching*, *19*(9), 743-760.

Lederman, N. G. (2007). Nature of science: Past, present, and Future. In Abell, S. K., & Lederman, N. G. (Eds.), *Handbook of Research on Science Education* (pp. 831-879). London: Lawrence Erlbaum Associates.

Lederman, N. G., Abd-El-Khalick, F., Bell, R. L., & Schwartz, R. S. (2002). Views of nature of science questionnaire: Toward valid and meaningful assessment of learners' conceptions of nature of science. *Journal of Research in Science Teaching*, *39*(6), 497-521.

Matthews M. (1994). *Science teaching: The role of history and philosophy of science* (pp. 49-50). London: Routledge.

McComas, W. F. (1993). The effects of an ıntensive summer laboratory ınternship on secondary students' understanding of the nature of science as measured by the test on understanding of science (TOUS). Paper presented at *the National Association for Research in Science Teaching Annual Meeting*, April.

McComas, W. F. (2004). Keys to teaching the nature of science. *The Science Teacher*, *71*(9), 24.

Mccomas, W. F., & Olson, J., K. (2000) International science education standards documments (pp.41-52) In W.F.Mccomas (Ed.). *The nature of science in science education rationales and strategies*. Kluwer Academic Publishers

McComas, W. F., Clough, M. P., & Almazroa, H. (1998). The role and character of the nature of science in science education. In W. F. McComas. (Ed.). *The nature of science in science education. science & technology education library.* Dordrecht: Springer.

McCullick, B., Belcher, D., Hardin, B., & Hardin, M. (2003). Butches, bullies and buffoons: Images of physical education teachers in the movies. *Sport, Education and Society*, *8*(1), 3-16.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.

Ministry of National Education [MEB]. (2013). *Science curriculum*. Ministry of National Education, Board of Education and Discipline Presidency: Ankara.

Moss, D. M., Abrams, E. D., & Kull, J. R. (1998). Describing students' conceptions of the nature of science over an entire school years. *Annual Meeting of the National Association for Research in Science Teaching. San Diego, CA*.

Nadir, U. (2013). Aile danısmanlığı eğitimlerinde popüler filmlerin kullanımı ve yapısal aile terapisi kuramı ile dalgaların prensi filminin analizi. *Toplum ve Sosyal Hizmet*, *24*(1), 129-144.

National Research Council [NRC] (1996). *National science education standarts*. Washington, DC: National Academic Press

Navakanesh, B., Shah, A. A., & Prasanna, M. V. (2019). Earthquake education through the use of documentary movies. *Frontiers in Earth Science*, *7*, 42.

Özkan, U. B. (2021). *Eğitim bilimleri araştırmaları için dokuman inceleme yontemi*. Ankara: Pegem Akademi.

Piliouras, P., Siakas, S., & Seroglou, F. (2011). Pupils produce their own narratives inspired by the history of science: Animation movies concerning the geocentric heliocentric debate. *Science & Education*, *20*(7-8), 761-795.

Pokromski, M. , & Noelle, M. (2016). Marie Curie. Retrieved from https://www.imdb.com/title/tt5705058/

Schwartz, R. S.(2004). *Epistemological views in authentic science practices: A cross-discipline comparison of scientists' views of nature of science and scientific inquiry*. (Unpublished doctoral dissertation). Oregon State University, Corvallis, Oregon.

Smith, M. U., Lederman, N. G., Bell, R. L., McComas, W. F., & Clough, M. P. (1997). How great is the disagreement about the nature of science? A response to alters. *Journal of Research in Science Teaching*, *34*(10), 1101-1103.

Smith, U. M., & Scharmann, L. C. (1999). Defining versus describing the nature of science: A pragmatic analysis for classroom teachers and science educators. *Science Education, 83*(4), 493-509.

Taber, K. S. (2002). *Alternative conceptions in chemistry-prevention, diagnosis and cure: Volume I: Theoretical background.* The Royal Society of Chemistry: London.

Turan, S. (2022). Dervis Zaim filmlerinin eko elestirel yaklasımla incelenmesi: Devir, balık ve rüya. *İstanbul Aydın Üniversitesi Sosyal Bilimler Dergisi*, *14*(2) , 199-223.

Yıldırım, E. G., Koklukaya, A., & Selvi, M. (2015). Ogretim materyali olarak 3-Idiot filmi ile ogretmen adaylarının gunluk hayatta fenin kullanımı ve egitimde aile rolu uzerine goruslerinin belirlenmesi. *Trakya Universitesi Egitim Fakultesi Dergisi, 5*(2), 94-105.

Yılmaz, M. (2018). Filmlerin ogretim materyali olarak kullanılması ve biyoloji egitimindeki yansımaları. *İnformal Ortamlarda Araştırmalar Dergisi*, 3(2), 24-37.

Author Information

Munise Seckin Kapucu
Eskisehir Osmangazi University
Eskisehir, Turkey
Contact e-mail: *muniseseckin@hotmail.com*

To cite this article:

Seckin-Kapucu, M. (2023). Analyzing the documentary film "Marie Curie" in terms of the nature of science themes. *The Eurasia Proceedings of Educational & Social Sciences (EPESS), 31,* 17-25.