



Errors and inaccuracies about celestial bodies in the Greek texts of children's fiction books about atmospheric pollution

Dimitra Kazantzidou¹ , Konstantinos T. Kotsis^{1*} 

¹Department of Primary Education, University of Ioannina, Ioannina, GREECE

*Corresponding Author: kkotsis@uoi.gr

Citation: Kazantzidou, D., & Kotsis, K. T. (2023). Errors and inaccuracies about celestial bodies in the Greek texts of children's fiction books about atmospheric pollution. *International Journal of Professional Development, Learners and Learning*, 5(2), ep2314. <https://doi.org/10.30935/ijpdll/13754>

ABSTRACT

This paper examines children's fiction books on air pollution in terms of the accuracy of their content in the representation of celestial bodies. The qualitative content analysis identifies and records in the text of 18 books passages containing errors and inaccuracies about celestial bodies. The passages are organized and presented in a category system while also being linked to the possible alternative ideas they may generate in children. The results show that the Earth, the planets, the Sun, and the stars are only sometimes represented based on scientific standards. Finally, the common errors and inaccuracies are presented. At the same time, suggestions are made for using these books in teaching and learning in science and environmental education in order to avoid misconceptions from their students.

Keywords: celestial bodies, fiction books, atmospheric pollution

Received: 01 Sep. 2023 ♦ Accepted: 29 Sep. 2023

INTRODUCTION

Children, from an early age and daily, make observations of the celestial bodies and the phenomena related to them (Kallery, 2011). Changes in the appearance and position of the Sun, the Moon, and stars are part of children's daily experiences worldwide (Plummer & Kuhlman, 2008). Children's contact with astronomy is also often made through children's literature (Trundle et al., 2008). Among Greek and foreign readers, heavenly bodies are covered in fiction and informational books. Reading these books by parents and children, as well as discussing the text and illustrations, are some of the children's first experiences with the science of astronomy (Trundle et al., 2008).

More and more researchers agree that children's literature, including picture books, fiction, and non-fiction books, can be used in science teaching and learning (Monhardt & Monhardt, 2006; Morrow et al., 1997). Children's literature supports learning natural concepts by allowing children to make observations, formulate questions, and reach conclusions from a set of facts presented in a meaningful environment to children (Pringle & Lamme, 2005). Indeed, according to Broemmel and Rearden (2006), integrating children's literature in the teaching of sciences leads to a better understanding of natural concepts and promotes enthusiasm for science.

However, the use of children's literature can also have a negative effect on children's ideas about the concepts and phenomena of science. Empirical studies in the field of reading have concluded that children, especially young children, learn not only the correct information but also the errors embedded in the content of the stories (Fazio & Marsh,

2008; Marsh et al., 2003). Kazemek et al. (2004) investigated how children's literature and culture, in general, influence children's thinking, focusing primarily on ideas about the moon. The results showed that when a parent reads a picture book about the moon, with text errors and incorrect illustrations representations, it may "unintentionally help form a misconception in the child" (Kazemek et al., 2004). This research also agrees with the position of Ault Jr (1984), who considers that the origin of children's alternative ideas about the phases of the moon stems from its incorrect representation in children's literature books. In the field of children's literature, they did it their appearance numerous narratives with environmental content (Karakitsios, 2005). The reason was the increase in environmental charges problems in Greece and the rest of the world. The surveys conclude that the use of children's books with environmental content leads to a better understanding of concepts about the environment by children (Hsiao & Shih, 2016). The influence, in fact, of these books, towards the development of environmentally responsible behaviour, appears to be greater in relation to the influence of television or newspapers, while they also contribute to the development of sensitivity towards the environment (Mobley et al., 2010).

Researchers, however, draw attention to the accuracy of their content before using them, as for reasons of fun and readability, they may contain inaccuracies and errors (Meyer, 2002). Hug (2010) states that a condition for using children's books with environmental content is the examination of their scientific accuracy. From the literature review, some studies were identified that examined their content in terms of the representation of issues related to the environment.

Christenson (2009), for example, reviewed informative children's books on recycling. The research aimed to examine how children's literature presents waste management and recycling and identify which aspects of waste management are included or emphasized. In Greece, Hamalidou and Flogaiti's (2013) research examined ecological fairy tales in terms of the environmental issues they contain, their frequency, and the place they occupy in them. Furthermore, they studied the cognitive and ideological orientations in the approach to air pollution and soil pollution from solid waste. In both studies, the content and potential inaccuracies were not determined by the mentioned investigations.

Only a few studies have been conducted on children's books to examine the accuracy of their scientific content (Ford, 2006). The literature review identified only two studies that examined children's literature books for their accuracy on astronomy-related topics. Trundle and Troland (2005) and Trundle et al. (2008), therefore, evaluated 80 children's books that focused on the moon and found that many needed to represent it accurately. Unobservable shapes of the moon and inaccuracies in the sequence of phases were some of the errors they recorded. From the results, they concluded that children's books might contain errors and inaccuracies about the moon and be a source of alternative ideas for children. In Greece, the research of Kazantzidou and Kotsis (2023c) examined fairy tale books and showed that they contain errors and inaccuracies about celestial bodies. The same researchers in another research showed errors and inaccuracies about the environment in fairy tale books (Kazantzidou & Kotsis, 2017). Also, the representation of the ozone layer in children's trade books about ozone layer depletion contains errors and is a possible source of alternative ideas for children (Kazantzidou & Kotsis, 2023a, 2023b).

The purpose of this work is to examine the accuracy of the content of children's literature books on the topic of atmospheric pollution in terms of the representation of celestial bodies in the texts. The results are expected to identify celestial bodies that are not accurately represented in the text of the books, errors and inaccuracies in their representation, and possible alternative ideas that may be built or reinforced in children. With this research, therefore, teachers and those who choose to use the specific books will know in advance the mistakes and inaccuracies so that with appropriate actions, they can prevent the creation of alternative ideas in children.

METHODOLOGY

After a bibliographic search, the research sample comprised 18 books in four public municipal libraries. The electronic catalogs of the libraries were searched for children's books:

- a. with fiction,
- b. written or translated into the Greek language,
- c. on the topic of air pollution, and
- d. aimed at pre-school and school-aged children.

The sample, therefore, consisted of books whose central theme is the nature, creation, and effects of atmospheric pollution. For this reason, books with environmental problems that are effects of air pollution, such as the destruction of stratospheric ozone and the disruption of the greenhouse effect, were also included.

Regarding the typical characteristics of the sample, these books:

- a. were issued for the first time between 1997 and 2011,

- b. are aimed at children aged three to 12,
- c. are available for loan from libraries,
- d. the original language is Greek, except for one book written in Japanese,
- e. they are about air pollution, and
- f. they contain fictional stories.

Of these books, 13 belong to the fairy tale category and five to the dual-purpose category. They contain additional factual information and a fictional story on their last pages.

To examine the accuracy of the representation of the heavenly bodies in the texts of the sample, the following research question was formulated: "What are the inaccuracies and errors in the representation of the heavenly bodies in the text of the books?"

For the analysis of the texts, qualitative inductive content analysis was used during the research stages, as described by Mayring (2014). A specific methodological approach was chosen to analyse the material systematically, and the categories with errors and inaccuracies were formed after examining the texts. The advantage of this method is that the analysis of the texts is done in gradual steps and follows specific rules determined in advance (Mayring, 2000).

The texts were entered into the QCMap web application (<http://www.qcmap.org>) and read line by line. To select the excerpts and define the categories, the definition of the category was formulated. Specifically, the definition includes passages in the texts that do not correspond to the scientific description of the celestial bodies. Then, the level of abstraction was formulated, that is, how limited the content of the categories would be. This, then, was defined as error or inaccuracy found in description of heavenly bodies. An error is not defined as a grammatical or syntactical error but shows that authors misunderstand the celestial bodies they use in the narrative. An inaccuracy is defined as any expression used in everyday life and that represents prevailing scientific opinions about celestial bodies differently.

Therefore, if a passage was found to meet the above conditions, it formed a category or belonged to an existing one. At the end of the analysis, the categories formed were organized into broader categories based on the celestial bodies they referred to.

RESULTS

According to Mayring (2014), content analysis results in a list of categories. This list includes the category title, definition, examples from the texts, and coding rules when necessary (Mayring, 2014). For the specific research needs, in addition to the definition of each category and the examples, possible alternative ideas were added, which can be built or reinforced in the children after reading the sample texts.

A total of 47 passages with errors and inaccuracies regarding celestial bodies were recorded in 12 of the 18 texts studied. These passages were organized into a system of ten categories. These categories combined three broader categories:

1. planets and the Earth,
2. the Sun, and
3. the stars.

The results are in tabular form including the list of broad categories and categories (**Table 1**).

Table 1. Category system

| Category definition | Examples | Possible alternative ideas |
|---|--|--|
| 1. Planets & the Earth | | |
| This category includes any excerpt that does not represent the planets of our solar system, including the Earth, in a scientifically acceptable manner. Errors & inaccuracies concern: | | |
| 1.1. The motion of the Earth & the planets | 1.1. "All the planets revolved around themselves & at the same time around the Sun [...]" (The Red Giant), "[...] Neptune & Uranus [...] revolved around themselves them in a way contrary to rest [...]" (The Red Giant), "[...] the Earth shouted joyfully & made a turnaround itself [...]" (The Red Giant), & "[...] Augerinos [...] let dance begin, up there in sky" (The Invisible Umbrella). | 1.1. The planets revolve around themselves & the Sun. The planet Neptune rotates retrograde. The Earth rotates around itself at will because it wants to. Augerinos (Venus) dances in sky, his movement is disorderly. |
| 1.2. The shape of the Earth | 1.2. "[...] for his journey to every corner of the Earth" (Saint Basil this year is green), "[...] children from all corners of the Earth" (The black cloud), "[...] to ends of the Earth" (The night of the fireflies), & "From there on high he sees what is happening on whole Earth" (Once upon a time in a magical forest). | 1.2. The Earth is flat & has edges, corners, or some end. The Sun looks down on whole of Earth. Its shape is flat with corners. |
| 1.3. The size of the Earth | 1.3. "-Are you holding on to a moment? -Yes, but in a little while I will give her to you to take care of her" (Children in action) & "So, they lent the Earth to great [...]" (Children in action). | 1.3. The Earth is small in size. Can someone catch her? |
| 2. The Sun | | |
| This category includes any passage that does not represent the Sun in scientifically accepted way. Errors & inaccuracies concern: | | |
| 2.1. The succession of day & night, as this phenomenon, is linked to apparent movement of the Sun & performance of anthropomorphic elements in night. | 2.1. "It was evening, & the Sun was going down [...]" (Paul & Lara travel), "As the Sun rises [...]" (The Invisible Umbrella), "[...] the Sun started his daily journey through sky [...]" (The Invisible Umbrella), & "The night went with them, & she got angry too" (The Night of the Fireflies). | 2.1. Succession of day & night is due to movement of the Sun. Specifically, it ascends & descends in sky, rises, & sets, & falls & rises. The Sun travels across sky. By extension, sky surrounds the Earth, & all heavenly bodies are above it. Night is an entity, she gets angry, walks, yawns, stretches her arms & pushes clouds, & hugs. |
| 2.2. The Sun-the Earth distance | 2.2. "They (clouds) are closer to the Sun & play hide & seek with him [...]" (The invisible umbrella) & "The Sun is in middle of sky" (Tzitziko-Pericles & the 5th season of the year). | 2.2. The Sun is at a close distance from the Earth. Clouds are close to the Sun & hide it. The Sun is in middle of sky. The Sun & the Earth can be connected by a tube. |
| 2.3. Its rotational motion | 2.3. "[...] it began to revolve around itself, so that everyone in the Galaxy could [...]" (The Red Giant) & "It took 27 days to make one revolution around itself [...]" (The Red Giant). | 2.3. The Sun revolves around itself at will. It rotates in 27 days around itself. |
| 2.4. The age | 2.4. "[...] two billion years ago [...]" a huge, blazing star was born on the firmament: The Sun!" (The Red Giant). | 2.4. It was created two billion years ago. |
| 3. The stars | | |
| This category includes any passage that does not represent the stars in scientifically accepted way. Errors & inaccuracies concern: | | |
| 3.1. Their identification with planets of our solar system | 3.1. "I was the most beautiful planet, the happiest star in the Galaxy..." (The Red Giant) & "The Sun was the most beautiful star, the most impressive planet [...]" (The Red Giant). | 3.1. Planets like the Earth, Neptune, & Uranus are stars. The Sun is a planet. Stars are similar in size & look like planets. Planets emit light. |
| 3.2. Their identification with meteoroids | 3.2. "Look, a star has fallen [...]" (Tzitziko-Pericles & the 5th season of the year). | 3.2. Shooting stars are stars that fall to the Earth. The stars are falling. |
| 3.3. Their appearance as members of our solar system | 3.3. "[...] around the Sun gathered another 1,600 smaller stars, satellites, & comets" (The Red Giant) & "[...] with other stars of company of the Sun [...]" (Mrs. Nature & the Evil Pollutant). | 3.3. In our solar system, there are other stars beside the Sun. |

CONCLUSIONS

The results show that the studied children's fiction books on air pollution contain errors and inaccuracies in representing celestial bodies. Children may construct alternative ideas or reinforce existing ones regarding the Earth, the planets, the Sun, and the stars by reading these errors and inaccuracies.

Regarding the individual characteristics of errors and inaccuracies, a non-separation of certain concepts or their incorrect use was observed. Star and planet are synonymous, as the Earth and the Sun are planets and stars. Empirical studies show that children and adults confuse these two concepts. Thus, some secondary school students consider stars planets (Gorecek Baybars & Can, 2018), and some adults consider the Sun a planet (Lightman & Miller, 1989). So, reading the passages can reinforce already existing alternative ideas or construct new ones. Also, it was observed that some concepts need to be corrected in place of other concepts. Specifically, the concept of rotation is used in place of the concept of orbit, and the concept of a star is used in place of the concept of a meteor. Children may need clarification about celestial bodies' motion and a star's characteristics, such as size, shape, and differentiation from a planet or meteor.

In the texts, inaccuracies related to expressions of everyday language concerning the shape of the Earth were also recorded, such as the passage: "[...] for his journey to every corner of the Earth." (Santa Claus is green this year). These expressions give the Earth a flat shape, edges, and corners. Research by Vosniadou and Brewer (1992) shows that children aged eight and nine think the Earth is flat or like a plate with an edge. Children, therefore, reading the passages may create or reinforce the alternative idea that the Earth is flat and has edges or corners.

The use of sensory data was observed in representing the phenomenon of the succession of day and night as well as in the distance of the Sun from the Earth. Thus, the succession of day and night is not connected with the rotation of the Earth around itself but with the Sun's apparent movement from East to West. The Sun is presented at a close distance from the Earth, as it is placed near the clouds or in the centre of the sky.

Also, errors were recorded, which show that the authors have a wrong impression of certain characteristics of the celestial bodies. Thus, in the description of the solar system, other stars besides the Sun are included. Possibly, the authors are referring to other celestial bodies in our solar system, for example, the planets or asteroids. An error was also recorded regarding the movement of the planet Neptune. Neptune appears to perform retrograde rotation around itself, as with the planet Uranus. However, according to astronomy, only Venus and Uranus rotate retrograde in relation to the rest of the planets (Avgoloupis & Seiradakis, 2009). Errors were also recorded regarding the Sun's rotational motion and its age. The Sun appears to rotate around itself at will and even completes a complete rotation in 27 days. Its age is estimated at two billion years, which is inconsistent with the scientific view, which places its birth at 4.6 billion years (Avgoloupis & Seiradakis, 2009).

In some passages recorded, anthropomorphism was also observed, which may lead to alternative ideas about the movement of the Earth and the planet Venus. The use of anthropomorphism was also observed in some books in the Earth and the Sun description to point out the causes or consequences of atmospheric pollution. In some passages, for

example, the Earth is presented as a living organism that has become ill due to adult mismanagement. Thus, the planet appears to have a fever, as its temperature rises, to have sores and pain. The authors point out the destructive consequences of air pollution with these descriptions. However, these passages were not included in the construction of the categories since the alternative ideas that could be generated are mainly related to the representation of environmental problems. Their recording, therefore, could be done in the context of a study regarding the accuracy of the representation of the phenomenon of air pollution in books.

The present research shows that in addition to children's books with topics related to astronomy (Trundle & Troland, 2005; Trundle et al., 2008), errors and inaccuracies about celestial bodies are also contained in other types of children's literature, such as those with environmental content. Moreover, the writing of these books was not done to learn concepts and phenomena of astronomy but to inform and sensitise children about environmental problems. Their content needs to be checked for accuracy in the Sciences so that the appropriate corrections can be made. Furthermore, the social language of science differs from the language of literature used in book texts, which may account for the discrepancies observed between their content and scientific knowledge (Scott et al., 2007).

Many researchers have highlighted the benefits of using children's environmental books in education. Indicatively, children's environmental texts contribute to making children responsible and sustainable citizens of the future (Massey & Bradford, 2011). The existence of mistakes and inaccuracies in their content does not constitute a reason for their exclusion from the educational process. On the contrary, it is suggested to use them in an interdisciplinary context, where these books become an occasion for examining issues related to astronomy. Through observations and comparisons of book content with informational books whose content is accurate, children could identify inaccuracies and errors and build the corresponding scientific knowledge. In this way, students will become familiar with the critical approach to print and non-print material so that they only accept its content in advance as accurate.

The present study focused on the accuracy of the representation of the heavenly bodies in the text of the books. The study of images and their role could be the subject of another study. Finally, conducting empirical studies on the effect of inaccuracies and mistakes on children's ideas about sciences could lead to more effective ways of utilizing them in teaching to prevent the creation or reinforcement of alternative ideas.

Author contributions: Both authors were involved in concept, design, collection of data, interpretation, writing, and critically revising the article. Both authors approved the final version of the article.

Funding: The authors received no financial support for the research and/or authorship of this article.

Ethics declaration: The authors declared that the study does not require ethical approval since it is based on existing literature.

Declaration of interest: The authors declare no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

REFERENCES

- Ault Jr, C. R. (1984). Intelligently wrong: Some comments on children's misconceptions. *Science and Children*, 21(8), 22-24.
- Avgoloupis, S., & Seiradakis, I. (2009). *Observational astronomy*. Planetarium.
- Broemmel, A. D., & Rearden, K. T. (2006). Should teachers use the teachers' choice books in science classes? *The Reading Teacher*, 60(3), 254-265. <https://doi.org/10.1598/RT.60.3.5>
- Christenson, M. A. (2009). Children's literature on recycling: What does it contribute to environmental literacy? *Applied Environmental Education & Communication*, 7(4), 144-154. <https://doi.org/10.1080/15330150902744160>
- Fazio, L. K., & Marsh, E. J. (2008). Older, not younger, children learn more false facts from stories. *Cognition*, 106(2), 1081-1089. <https://doi.org/10.1016/j.cognition.2007.04.012>
- Ford, D. J. (2006). Representations of science within children's trade books. *Journal of Research in Science Teaching*, 43(2), 214-235. <https://doi.org/10.1002/tea.20095>
- Gorecek Baybars, M., & Can, S. (2018). Middle school students' misconceptions about the concepts of astronomy. *International Education Studies*, 11(11), 34-45. <https://doi.org/10.5539/ies.v11n11p34>
- Hamalidou, E., & Flogaiti, E. (2013). Environmental issues in modern preschool ecological fairy tales: The case of air pollution and soil pollution from urban solid waste. In A. Dimitriou (Ed.), *Nature and environmental concepts in preschool education* (pp. 131-140). Epicentro.
- Hsiao, C. Y., & Shih, P. Y. (2016). Exploring the effectiveness of picture books for teaching young children the concepts of environmental protection. *International Research in Geographical and Environmental Education*, 25(1), 36-49. <https://doi.org/10.1080/10382046.2015.1106203>
- Hug, J. W. (2010). "Eew! There's dew on my toes": Common characteristics of pre-service elementary teacher learning in environmental education and instructional strategies for science teacher educators. In A. Bodzin, B. Shiner Klein, & S. Weaver (Eds.), *The inclusion of environmental education in science teacher education*. Springer. https://doi.org/10.1007/978-90-481-9222-9_9
- Kallery, M. (2011). Astronomical concepts and events awareness for young children. *International Journal of Science Education*, 33(3), 341-369. <https://doi.org/10.1080/09500690903469082>
- Karakitsios, A. (2005). Reading children's literature with ecological content. In A. Georgopoulos (Ed.), *Environmental education: The new emerging culture* (pp. 607-618). Gutenberg.
- Kazantzidou, D., & Kotsis, K. (2017). Errors and inaccuracies about the environment in fairy tales: An analysis of written text. *Science Education Research & Praxis*, 61(Special issue), 9-23.
- Kazantzidou, D., & Kotsis, K. T. (2023a). Representations of the celestial bodies in fairy tale texts. *Aquademia*, 7(2), ep23005. <https://doi.org/10.30935/aquademia/13442>
- Kazantzidou, D., & Kotsis, K. T. (2023b). Ozone layer depletion in children's books available in Greece: Examining accuracy in the representation of causes of ozone layer depletion in texts. *Children's Literature in Education*. <https://doi.org/10.1007/s10583-023-09524-0>
- Kazantzidou, D., & Kotsis, K. T. (2023c). Representation of the ozone layer in children's trade books about ozone layer depletion: An analysis of written texts in Greece. *Interdisciplinary Journal of Environmental and Science Education*, 19(1), e2302. <https://doi.org/10.29333/ijese/12847>
- Kazemek, F., Louisell, R., & Wellik, J. (2004). *Children's stories about their natural worlds: An exploration from multiple perspectives (and an invitation to participate)* [Paper presentation]. The National Association of Research in Science Teaching Annual Meeting.
- Lightman, A. P., & Miller, J. D. (1989). Contemporary cosmological beliefs. *Social Studies of Science*, 19(1), 127-136. <https://doi.org/10.1177/030631289019001004>
- Marsh, E. J., Meade, M. L., & Roediger III, H. L. (2003). Learning facts from fiction. *Journal of Memory and Language*, 49(4), 519-536. [https://doi.org/10.1016/S0749-596X\(03\)00092-5](https://doi.org/10.1016/S0749-596X(03)00092-5)
- Massey, G., & Bradford, C. (2011). Children as ecocitizens: Ecocriticism and environmental texts. In K. Mallan, & C. Bradford (Eds.), *Contemporary children's literature and film: Engaging with theory* (pp. 109-126). Palgrave Macmillan. https://doi.org/10.1007/978-0-230-34530-0_7
- Mayring, P. (2000). Pensionierung als Krise oder Glücksgewinn?—Ergebnisse aus einer quantitativ-qualitativen Längsschnittuntersuchung [Retirement as crisis or gain of happiness?—Results of a qualitative-quantitative longitudinal study]. *Zeitschrift für Gerontologie und Geriatrie [Journal of Gerontology and Geriatrics]*, 33, 124-133. <https://doi.org/10.1007/s003910050168>
- Mayring, P. (2014). *Qualitative content analysis. Theoretical foundation, basic procedures and software solution*. Beltz. https://doi.org/10.1007/978-94-017-9181-6_13
- Meyer, J. M. (2002). Accuracy and bias in children's environmental literature: A look at Lynne Cherry's books. *The Social Studies*, 93(6), 277-281. <https://doi.org/10.1080/00377990209600179>
- Mobley, C., Vagias, W. M., & DeWard, S. L. (2010). Exploring additional determinants of environmentally responsible behavior: The influence of environmental literature and environmental attitudes. *Environment and Behavior*, 42(4), 420-447. <https://doi.org/10.1177/0013916508325002>
- Monhardt, L., & Monhardt, R. (2006). Creating a context for the learning of science process skills through picture books. *Early Childhood Education Journal*, 34, 67-71. <https://doi.org/10.1007/s10643-006-0108-9>
- Morrow, L. M., Pressley, M., Smith, J. K., & Smith, M. (1997). The effect of a literature-based program integrated into literacy and science instruction with children from diverse backgrounds. *Reading Research Quarterly*, 32(1), 54-76. <https://doi.org/10.1598/RRQ.32.1.4>
- Plummer, D. M., & Kuhlman, W. (2008). Literacy and science connections in the classroom. *Reading Horizons: A Journal of Literacy and Language Arts*, 48(2), 95-110.

- Pringle, R. M., & Lamme, L. L. (2005). Using picture storybooks to support young children's science learning. *Reading Horizons: A Journal of Literacy and Language Arts*, 46(1), 2.
- Scott, P., Asoko, H., & Leach, J. (2007). Student conceptions and conceptual learning in science. In S. Abell, & N. Lederman (Eds.), *Handbook of research on science education* (pp. 31-56). Lawrence Erlbaum Associates.
- Trundle, K. C., & Troland, T. H. (2005). The Moon in children's literature. *Science and Children*, 43(2), 40-43.
- Trundle, K. C., Troland, T. H., & Pritchard, T. G. (2008). Representations of the moon in children's literature: An analysis of written and visual text. *Journal of Elementary Science Education*, 20(1), 17-28. <https://doi.org/10.1007/BF03174700>
- Vosniadou, S., Brewer, W. F. (1992). Mental models of the Earth: A study of conceptual change in childhood. *Cognitive Psychology*, 24(4), 535-585. [https://doi.org/10.1016/0010-0285\(92\)90018-W](https://doi.org/10.1016/0010-0285(92)90018-W)