

WHAT DO THE PICTURES SAY IN A SCIENCE TEXTBOOK?

A Research Paper

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Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar
Sarjana Sastra pada Fakultas Pendidikan Bahasa dan Sastra

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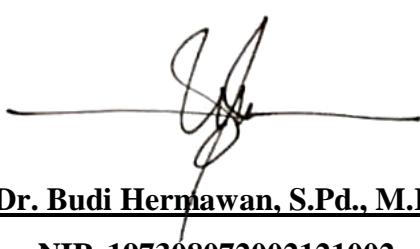
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ABSTRACT

Many studies have proven that images are essentials in learning science to help the learners understand the abstract scientific concept. Therefore, this study aims to investigate the use of images in a science textbook, by looking at the ideational meaning of the images and the captions accompanying them. By doing multimodal analysis, the study focuses on identifying the types of images and types of processes used in the images to find the ideational meaning. The data for this study are taken from the first six chapters in the Chemistry textbook used by IPSE students at UPI. The theory of reading images (Kress & Van Leeuwen, 2006) and Systemic Functional Grammar (Halliday, 1994) were used to analyze the visual and verbal modes in the textbook. The result of the analysis shows that ideationally, in terms of types of images, the textbook dominantly used realistic images, the one which represents reality in human viewpoint. In terms of types of processes, analytical images are dominantly used in the textbook. Ideationally, the visual and the verbal modes in the textbook are complementing each other to strengthen the meaning of the scientific concept that is being delivered to the learners. Thus, gleaned from the findings of the present research it can be said that the Chemistry textbook used by IPSE students is one of the example of a good textbook that can help the learners in understanding the scientific materials being delivered.

Keywords: *Ideational meaning, multimodal analysis, reading images, science, systemic functional grammar, textbook*

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REFERENCES

- Aggarwal, R., & Ranganathan, P. (2019). Study designs: Part 2 – Descriptive studies. *Perspectives in clinical research*, 10(1), 34–36. https://doi.org/10.4103/picr.PICR_154_18
- Ajayi, L. (2012). How teachers deploy multimodal textbooks to enhance English language learning. *Tesol Journal*, 6(1), 16-35.
- Akçay, H , Kapıcı, H , Akçay, B . (2020). Analysis of the Representations in Turkish Middle School Science Textbooks from 2002 to 2017 . Participatory Educational Research , 7 (3) , 192-216 . DOI: 10.17275/per.20.42.7.3
- Bezemer, J., & Jewitt, C. (2009). Social semiotics. *Handbook of Pragmatics*, 1-13. doi: 10.1075/hop.13.soc5
- Bobek, E., & Tversky, B. (2016). Creating visual explanations improves learning. *Cognitive Research: Principles and Implications*, 1(1). doi: 10.1186/s41235-016-0031-6
- Chen, Y. (2010). *Exploring dialogic engagement with readers in multimodal EFL textbooks in China*. 9(4), 485–506. <https://doi.org/10.1177/1470357210382186>
- Darian, S. (2001). More than meets the eye. The role of visuals in science textbooks. *LSP and professional communication (2001-2008)*, 1(1).
- Denzin, N., & Lincoln, Y. (2005). *The SAGE handbook of qualitative research*. Thousand Oaks: Sage Publications.
- Devetak, I., & Vogrinc, J. (2013). The criteria of evaluating the quality of the science textbooks. In: Khine, M.S., (Eds.), *Critical Analysis of Science Textbooks: Evaluating Instructional Effectiveness*. Dordrecht, the Netherlands: Springer. pp. 3-15.
- Dimopoulos, K., Koulaidis, V., & Sklaveniti, S. (2003). Towards an analysis of visual images in school science textbooks and press articles about science and technology. *Research in Science Education*, 33(2), 189-216.
- Divoli, A., Wooldridge, M. A., & Hearst, M. A. (2010). Full text and figure display improves bioscience literature search. *PloS one*, 5(4), e9619.
- Djonov, E. (2012). Book review: Carey Jewitt (ed.), The Routledge Handbook of Multimodal Analysis. *Visual Communication*, 11(2), 237-248. doi: 10.1177/1470357211434033
- Earl, B., & Wilford, D. (2014). *Cambridge IGSCE Chemistry* (3rd ed.). London: Hodder Education.
- Emilia, E. (2014). *Introducing Functional Grammar*. Bandung: Pustaka Jaya.

- Essays, UK. (November 2018). Why Science is Difficult to Learn. Retrieved from <https://www.ukessays.com/essays/education/why-can-science-be-difficult-to-learn-education-essay.php?vref=1>
- Evagorou, M., Erduran, S., & Mäntylä, T. (2015). The role of visual representations in scientific practices: from conceptual understanding and knowledge generation to 'seeing' how science works. *International Journal of STEM Education*, 2(1). doi: 10.1186/s40594-015-0024-x
- Ezzina, R. (2016). Transitivity Analysis of «The Crying lot of 49» by Thomas Pynchon. *International Journal of Humanities and Cultural Studies (IJHCS) ISSN 2356-5926*, 2(3), 283-292.
- Ge, Y., Unsworth, L., Wang, K., & Chang, H. (2017). What Images Reveal: A Comparative Study of Science Images between Australian and Taiwanese Junior High School Textbooks. *Research In Science Education*, 48(6), 1409-1431. doi: 10.1007/s11165-016-9608-9
- Gerot, L. & Wignell, P. (1994). *Making sense of functional grammar*. Australia: Gerd Stabler.
- Haiyan, L. (2018). Image-text Relations in Junior High School EFL Textbooks in China: A Mixed-methods Study. *Journal of Language Teaching and Research*. 9. 1177. 10.17507/jltr.0906.07.
- Halliday, M.A.K. (1994). *Introduction to functional grammar* (2nd ed.). London: Arnold.
- Hermawan, B. & Rahyono, F.X. (2019). Ideational meanings of science and interpersonal position of readers in science textbooks for basic level in Indonesia. *Indonesian Journal of Applied Linguistics*, 9, 38-47. doi: 10.17509/ijal.v9il.15932
- Hermawan, B. (2013). Multimodality: Menafsir verbal, Membaca Gambar, dan Memahami Teks. *Jurnal Pendidikan Bahasa dan Sastra*, 13(1), 19-28.
- Hermawan, B., & Sukyadi, D. (2017). Ideational and interpersonal meanings of children narratives in Indonesian picturebooks. *Indonesian Journal of Applied Linguistics*, 7(2), 404-412.
- Humphrey, S., Droga, L., & Feez, S. (2012). *Grammar and meaning*. Sydney: Primary English Teaching Association Australia (PETAA).
- Jamshidzadeh, Z., Jam, B. (2017). The Visual Transitivity System in Two ELT Books Series. *Research in Applied Linguistics*, 8 (Proceedings of the Fourth International Conference on Language, Discourse and Pragmatics), 7-13. doi: 10.22055/rals.2017.12860

- Johnstone, A. H., (1991). Why is science difficult to learn? Things are seldom what they seem. *Journal of Computer Assisted Learning*. 7, 75-83
- Khine, M. S., & Liu, Y. (2017). Descriptive Analysis of the Graphic Representations of Science Textbooks. *European Journal of STEM Education*, 2(3), 6.
- Kim, S., Lamkin, S., & Duncan, P. (2010). Caption-based topical descriptors for microscopic images as published in academic papers. *Health Information & Libraries Journal*, 27(3), 235-243.
- Kress, G. & Van Leeuwen, T. (2001). *Multimodal Discourse The Modes and The Media of Contemporary Communication*. Great Britain: Arnold.
- Kress, G., & Van Leeuwen, T. (2006). *Reading images. The grammar of visual design* (2nd ed.). London: Routledge.
- Leivas Pozzer, L., & Roth, W. (2003). Prevalence, function, and structure of photographs in high school biology textbooks. *Journal Of Research In Science Teaching*, 40(10), 1089-1114. doi: 10.1002/tea.10122
- Lemke, Jay. (1998). Multiplying meaning: Visual and verbal semiotics in scientific text.
- Liu, J. (2013). Visual Images Interpretive Strategies in Multimodal Texts. *Journal of Language Teaching and Research*, 4, 1259-1263.
- Lynch, M., & Woolgar, S. (1990). Representation in scientific practice.
- Machin, A. & Mayr, D. (2012). *How to do critical discourse analysis*. London: SAGE Publications.
- Mason, R., Morphet, T., & Prosalendis, S. (2006). Reading scientific images. Cape Town, South Africa: HSRC Press.
- Mogull, S., & Stanfield, C. (2015). Current use of visuals in scientific communication. *2015 IEEE International Professional Communication Conference (IPCC)*. doi: 10.1109/ipcc.2015.7235818
- Mohamed, M. A. S. (2015). The Role of English Language Textbooks in the Reproduction of Racism. *International Journal of English Language & Translation Studies*. 3(1), 95-108. Retrieved from <http://www.eltsjournal.org>
- Reading and explaining visual scientific images. (2020). Retrieved 7 August 2020, from
<https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/english/literacy/Pages/reading-visual-images.aspx>
- Richards, A. (2003). Argument and authority in the visual representations of science. *Technical Communication Quarterly*, 12(2), 183–206. doi:10.1207/s15427625tcq1202_3.

- Richards, J. C. (2001). The Role of Textbooks in a Language Program. 1–6.
- Rončević, T., Ćuk, Ž., Rodić, D., Segedinac, M., & Horvat, S. (2019). An Analysis Of The High School Students' Abilities To Read Realistic, Conventional, And Hybrid Images In General Chemistry. *Journal Of Baltic Science Education*, 18(6), 943-954. doi: 10.33225/jbse/19.18.943
- Rynanta, R. A. C., & Ruslan, S. (2013). Content Analysis On the English Textbook Entitled ‘English in Mind Starter (Student’s Book)”. *Jurnal Online UM*.
- Schnitz, W., & Kurschner, C. (2007). External and internal representations in the acquisition and use of knowledge: Visualization effects on mental model construction. *Instructional Science*, 36, 175–190.
- Treagust, D.F., Won, M., & McClure, F. (2018). Multiple representations and students' conceptual change in science. In G. Amin and O. Levrini (Eds.), *Converging perspectives on conceptual change* (pp. 121 – 128). New York: Routledge.
- Vanderstoep, S., & Johnston, D. (2009). *Research methods for everyday life* (1st ed.). New Jersey: John Wiley & Sons, Inc.
- Walliman, N. (2017). *Research methods: The basics*. New York: Routledge.
- Wilson, A. A., & Landon-hays, M. (2016). A Social Semiotic Analysis of Instructional images across Academic Disciplines. *Visual Communication*, 1(15), 3–31. <https://doi.org/10.1177/1470357215609213>
- Wilson, A. A., & Landon-Hays, M. (2016). A social semiotic analysis of instructional images across academic disciplines. *Visual Communication*, 15(1), 3-31.
- Wilson, L. (2009). Definition of Science. Retrieved 26 February 2020, from <https://explorable.com/definition-of-science>
- Yulianti, R. (2011). Content Analysis on the English E-book “Developing English Competencies for Senior High School (SMA/MA) Grade X”. Malang: Faculty of Letters State University of Malang.