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Concept Maps in the Literature

Students and teachers enjoy or have positive attitudes about concept mapping, and concept mapping reduces test and content anxiety.

- Davis (1990)
- Horton, McConney, Gallo, Woods, Hamelin (1993)
- Jeged, Alaiyemol, & Okebukola (1990)
- Kaya (2007)
- Oliver & Raubenheimer (2006)
- Okebukola (1992)
- Rye & Rubba (1998)

Students and teachers feel concept maps help students learn course material more deeply.

- Bolte (1999)
- Briscoe & LeMaster(1991)
- Davis (1990)
- Edwards & Fraser (1983)
- Ferry (1996)
- Heinze-Fry & Novak (1990)
- Kaya (2007)
- Markhow & Lonning (1998)
- Oliver & Raubenheimer (2006)

Concept mapping can raise student achievement.

- Arnaudin, Mintzes, Dun, & Shafer (1984)
- Barenholz (1992)
- Esiobu & Soyibo (1995)
- Horton, McConney, Gallo, Woods, & Hamelin (1993)
- Jeged, Alaiyemol, & Okebukola (1990)
- Okebukola (1990)

Concept mapping is a valid and reliable tool for evaluating students' differences in learning and for finding misconceptions in student thinking.

- Arnaudin, Mintzes, Dun, & Shafer (1984)
- Austin & Shore (1995)
- Beyerbach (1986)
- Bolte (1999)
- Edwards & Fraser (1983)
- Hasemann & Mansfield (1995)
- Heinze-Fry & Novak (1990)
- Hoz, Bowman, & Chacham (1997)
- Iuli & Hellden (2004)
- Laturno (1994)
- Markham & Mintzes (1994)
- McClure, Sonak, & Suen (1999)
- Novak & Musonda (1991)
- Rice, Ryan, & Samson (1998)
- Wallace & Mintzes (1990)

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Citations

Arnaudin, M. W., Mintzes, J. J., Dun, C. S., & Shafer, T. H. (1984). Concept mapping in college science teaching. *Journal of College Science Teaching, 14*(2), 117-121.

Ault, Jr., C. R. (1985). Concept mapping as a study strategy in Earth science. *Journal of College Science Teaching, 15*, 38-44.

Austin, L. B., & Shore, B. M. (1995). Using concept mapping for assessment in physics. *Physics Education, 30*(1), 41-45.

Ausubel, D. P. (1968). *Educational Psychology: A Cognitive View*. New York: Holt, Rinehart, & Winston.

Barenholz, H., &, Pinchas, T. (1992). A comprehensive use of concept mapping in design. *Research in Science & Technological Education, 10*(1), n. p.

Bartels, B. H. (1995). Promoting mathematics connections with concept mapping. *Mathematics Teaching in the Middle School, 1*(7), 542-549.

Beyerbach, B. A. (1986). Concept mapping in assessing prospective teachers' concept development. ERIC Document Reproduction Service: ED 291800.

Bolte, L. A. (1999). Using concept maps and interpretive essays for assessment in mathematics. *School Science and Mathematics, 99*(1), 19-25.

Briscoe, C., & LeMaster, S. U. (1991). Meaningful learning in college biology through concept mapping. *American Biology Teacher, 53*(4), 213-219.

Canas, A. J., Coffey, J. W., Carnot, M. J., Feltovich, P., Hoffman, R. R., Feltovich, J., Novak, J. D. (2003). A Summary of Literature pertaining to the use of concept mapping techniques and technologies for education and performance support. A report prepared for the Chief of Naval Education and Training, Pensacola, FL. Retrieved on December 6, 2007 from http://www.ihmc.us/users/ user.php?UserID=acanas

Cilburn, J. W. (1987). How to do it. Helping students understand physiological interactions: A concept mapping activity. *The American Biology Teacher, 49*(7), 426-427.

Cilburn, J. W. (1990). Concept maps to promote meaningful learning. *Journal of College Science Teaching, 19*, 212-217

Cronin, P. J., Dekker, J., Dunn, J. G. (1982). A procedure for using and evaluating concept maps. *Research in Science Education, 12*(1), 17-24.

Davis, N. T. (1990). Using concept mapping to assist prospective elementary teachers in making meaning. *Journal of Science Teacher Education, 1*(4), 66-69.

Edwards, J., & Fraser, K. (1983). Concept maps as relectors of conceptual understanding. *Research in Science Education, 13*, 19-26.

Esiobu, G. O., & Soyibo, K. (1995). Effects of concept and vee mappings under three learning modes on students' cognitive achievement in ecology and genetics. *Journal of Research in Science Teaching, 32*(9), 971-995.

Ferry, B. (1996). Probing understanding: The use of a computer-based tool to help preservice teachers to map subject matter knowledge. *Research in Science Education, 26*(2), 233-245.

Hasemann, K., & Mansfield, H. (1995). Concept mapping in research on mathematical knowledge development: Background, methods, findings, and conclusions. *Educational Studies in Mathematics, 29*(1), 45-72.

Heinze-Fry, J. A., & Novak, J. D. (1990). Concept mapping brings long-term movement toward meaningful learning. *Science Education, 74*(4), 461-472.

Horton, P.B., McConney, A. A., Gallo, M., Woods, A. L., Senn, G. J., Hamelin, D. (1993). An investigation of the effectiveness of concept mapping as an instructional tool. *Science Education, 77*(1), 95-111.

Hoz, R., Bowman, D., & Chacham, T. (1997). Psychometric and edumentric validity of dimensions of geomorphological knowledge which are tapped by concept mapping. *Journal of Research in Science Teaching, 34*(9), 925-947.

Iuli, R. J., & Hellden, G. (2004) Using concept maps as a research tool in science education research. *Concept maps: Theory, methodology, technology proceedings of the first internationsl conference on concept mapping. A. J. Canas, J. D. Novak, F. M. Gonzalez, Eds.* Pamplona, Spain, 2004.

Jeged, O.J., Alaiyemol, F.F., Okebukola, P.A. (1990). The effect of a metacognitive strategy on students' anxiety and achievement in biology. *Journal of Research in Science Teaching*, *27*, 951-960.

Kaya, O. N. (2007). A student-centered approach: Assessing the changes in prospective science teachers' conceptual understanding by concept mapping in a general chemistry laboratory. *Research in Science Education.*

Laturno, J. (1994). The validity of concept maps as a research tool in remedial college mathematics. In D. Kirshner (Ed.), *Proceedings of the sixteenth annual meeting of the North American chapter of the International Group for the Psychology of Mathematics Education* (Vol 2, pp. 60 – 66). Baton Rouge: Louisiana State University.

Margulies, N. (1991). Mapping inner space: Learning and teaching mind mapping. Tucson, AZ: Zephyr Press.

Markham, K. M., & Mintzes, J. J. (1994). The concept map as a research and evaluation tool: Further evidence of validity. *Journal of Research in Science Teaching*, *31*(1), 91-101.

Markow, P. G., & Lonning, R. A. (1998). Usefulness of concept maps in college chemistry laboratories: Students' perceptions and effects on achievement. *Journal of Research in Science Teaching*, *35*(9), 1015-1029.

McClure, J. R., Sonak, B., Suen, H. K. (1999). Concept map assessment of classroom learning: Reliability, validity, and logistical practicality. *Journal of Research in Science Teaching*, *36*(4), 475-492.

Novak, J. D. (1998). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn*. New York: Cambridge University Press.

Novak, J. D., & Musonda, D. (1991). A twelve-year longitudinal study of science concept learning. *American Educational Research Journal*, *28*(1), 117-153.

Okebukola, P. A. (1992). Attitude of teachers toward concept mapping and vee diagramming as metalearning tools in science and mathematics. *Educational Research*, *34*(3), 201-213.

Okebukola, P. A. (1990). Attaining meaningful learning of concepts in genetics and ecology: An examination of the potency of the concept-mapping technique. *Journal of Research in Science Teaching*, *27*(5), 493-504.

Oliver, K. & Raubenheimer, D. (March 2006). Online concept mapping in distance teacher education: Two case studies. Paper presented at the Annual Conference of the Society for Information Technology and Teaching Education (SITE). Retrieved on August 29, 2007 at http://litre.ncsu.edu/docs/progress2005/oliver_pr2.doc

Rice, D. C., Ryan, J. M., & Samson, S. M. (1998). Using concept maps to assess student learning in the science classroom: Must different methods compete? *Journal of Research in Science Teaching*, *35*(10), 1103-1127.

Rye, J. A., & Rubba, P. A. (1998). An exploration of the concept map as an interview tool to facilitate the externalization of students' understandings about global atmospheric change. *Journal of Research in Science Teaching*, *35*(5), 521-546.

Wallace, J. D, & Mintzes, J. J. (1990). The concept map as a research tool: Exploring conceptual change in biology. *The Journal for Research in Science Teaching*, *27*(10), 1033-1052.