Collections then Connections: Science in Michigan Middle School Libraries

Research Problems

Despite their great amount of conceptual overlap, school library media programs and science education are rarely coordinated in schools (Mardis, 2005, 2007b). This problem arises from the intersection of these issues:

- U.S. science achievement is behind other countries (Martin, Mullis, Gonzalez, & Chrostowski, 2004);
- Few students are entering science careers and many scientists are retiring (National Science Foundation [NSF], 2006);
- NCLB mandates science testing as of next school year (Cawelti, 2006);
- Science is increasingly resource- and inquiry-based (National Research Council [NRC], 1996);
- National standards for school libraries and science learning overlap (Mardis, 2006b).
- School library media specialists are getting replaced with parapros or volunteers (LM_NET; mamelist);
- Teachers have issues of *time*, *territory*, *tendency,* and *tenure* (e.g., Clark & Yinger, 1979; Dennick & Joyes, 1994; Forlin, 2001; Fuller, 1969; Gelman & Greeno, 1989; Perrault, 2007) ;
- Administrators and teachers perceive school library media specialists as providing resources (Hartzell, 2001) (and Colorado study and replications);
- School library media specialists not confident with many science topics (Abilock, 2003);
- In Michigan, teachers become media specialists (Mardis, 2006a, 2007a).

Key Literature Concepts

- Reading is essential to science learning (O'Reilly & McNamara, 2007);
- Resource-based science learning best for ELL and differentiated instruction (Lee, 2005);
- Images (static and student-generated) and guided inquiry techniques support science learning (e.g., Atkinson & Bannister, 1998; Brown & Palincsar, 1989; Gates, 2004; Kracjik, Marx, & Soloway, 1999; Mardis, 2004);
- Predicting from data sets and research supports science learning (Windschitl & Thompson, 2006);
- Learner-centered activities are one of the few strategies linked to higher achievement (Cornelius-White, 2007).

Research Questions

- If strong school libraries are linked to reading achievement, can the same be said for school libraries and science achievement?
- How do teachers perceive the media center's ability to support science learning?
- How do media specialists perceive their ability to support science learning?
- What's in middle school science collections? Which aspects of the collection are most strongly linked to science learning?

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Sample

- Michigan middle schools that participated in Michigan School Library Study (Colorado study replication)
- 74 school media specialist representing geographically and economically diverse districts
- Mostly white; mostly female; most with MLS + teacher certification

Method

Quantitative

- Correlation and comparison of means
- Survey

Qualitative

- Interviews and virtual focus group (school library media specialists)
- Interviews and in-person focus group (teachers)
- Autoethnography (school library media specialists)

Conclusions

- Teachers consider school library collections as old and small (Mardis, 2004);
- School library science collections are old and small (Mardis & Hoffman, 2007);
- School libraries also link to science achievement; reading achievement and science achievement are highly correlated;
- Resources with visual imagery have strong correlation with science achievement;
- Successful school library media specialists leverage their space to connect with science teachers;
- The overriding perception of outsiders of school library media specialists is as resource providers;
- The overriding perception of insiders (school library media specialists) is as instructional collaborators and teachers, though few play these roles consistently;
- Collection-related activities help teachers make the transition to school library media specialist.

Implications

1. *Science is a high priority in U.S. K-12 education. In order to be high on the agenda, link your work to what's high on the agenda. Media specialists who work closely with science teachers are successful in all areas and have secure programs.*
2. *Different curriculum areas require different approaches. Work with the perception of a collection provider, not against it. Work from the strength of your collection, then you'll make a connection.*
3. *Running is like reading. While coaches may help athletes to run better, their unique function is to teach athletes use running and winning strategies to succeed in different games. While you may help kids to read better, you unique function is to teach them to use reading and learning strategies to succeed in different curriculum areas. Focus on how you can link reading improvement to science learning.*

References

Abilock, D. (2003, January/February). Collaborating with science teachers. *Knowledge Quest, 31,* 8-9.

Atkinson, H., & Bannister, S. (1998). Concept maps and annotated drawings. *Primary Science Review, 51*, 3-5.

Brown, A. L., & Palincsar, A. S. (1989). Guided, cooperative learning and individual knowledge acquistion. In L. B. Resnick (Ed.), *Knowing, Learning, and Instruction: Essays in Honor of Robert Glaser* (pp. 393-451). Hillsdale, NJ: Lawrence Erlbaum and Associates.

Cawelti, G. (2006). The side effects of NCLB. *Educational Leadership, 64*(2), 64-68.

Clark, C. M., & Yinger, R. J. (1979). Teachers' thinking. In P. L. Peterson & H. J. Walberg (Eds.), *Research on teaching: Concepts, findings, and implications*. Berkeley, CA: McCutchan.

Cornelius-White, J. (2007). Learner-centered teacher-student relationships are effective: A meta-analysis. *Review of Educational Research, 77*(1), 113-143.

Dennick, R., & Joyes, G. (1994). New science teachers' subject knowledge. *The School Science Review, 76*(275), 103.

Forlin, C. (2001). Inclusion: Identifying potential stressors for regular class teachers. *Educational Researcher, 43*(3), 235–245.

Fuller, F. F. (1969). Concerns of teachers: A developmental characterization. *American Educational Research Journal, 6*, 207-226.

Gates, S. (2004). Visual literacy in science and its importance to pupils and teachers. In A. Peacock & A. Cleghorn (Eds.), *Missing the meaning: The development and use of print and non-print text materials in diverse school settings* (pp. 223-237). New York: Palgrave MacMillan.

Gelman, R., & Greeno, J. G. (1989). On the nature of competence: Principles for understanding in a domain. In L. B. Resnick (Ed.), *Knowing, Learning, and Instruction: Essays in Honor of Robert Glaser* (pp. 125-186). Hillsdale, NJ: Lawrence Erlbaum and Associates.

Hartzell, G. (2001). The implications of selected school reform approaches for school library media services. *School Library Media Research, 4*.

Kracjik, J., Marx, R., & Soloway, E. (1999). Instructional, curricular, and technological supports for inquiry in science classrooms. In J. Minstell & E. Van Zee (Eds.), *Inquiry into inquiry: Science learning and teaching* (pp. 283-315). Washington, D.C.: American Association for the Advancement of Science Press.

Lee, O. (2005). Science education with English Language Learners: Synthesis and research agenda. *Review of Educational Research, 75*(4), 491-521.

Mardis, M. A. (2004). *Infusing Science into Middle School Media Centers: Obstacles and Strategies. A Final Report for the Institute for Library & Information Literacy Education (ILILE) National Research Grant Program.* (National Research Grant Final Grant Report). Kent, OH: Institute for Library & Information Literacy Education (ILILE).

Mardis, M. A. (2005). *The relationship between school library media programs and science achievement in Michigan middle schools.* Unpublished doctoral dissertation, Eastern Michigan University, Ypsilanti.

Mardis, M. A. (2006a, July 3-7). *An instrumental case study of a school librarian.* Paper presented at the International Association of School Librarians, Lisbon, Portugal.

Mardis, M. A. (2006b). Science teacher and school library media specialist roles: Mutually reinforcing perspectives as defined by national guidelines. In M. Orey, V. J. McClendon & R. B. Branch (Eds.), *Educational Media and Technology Yearbook 2006* (Vol. 31). Westport, CT: Libraries Unlimited.

Mardis, M. A. (2007a, April 10-12). *From teacher to media specialist: The role of field experience. An invited methodology paper for the REISL SIG.* Paper presented at the American Educational Research Association Chicago.

Mardis, M. A. (2007b). School libraries and science achievement: A view from Michigan's middle schools. *School Library Media Research, 10*.

Mardis, M. A., & Hoffman, E. S. (2007). Collection and collaboration: Science in Michigan middle school media centers. *Media Spectrum, 33*(3), 44-58.

Martin, M. O., Mullis, I. V. S., Gonzalez, E. J., & Chrostowski, S. J. (2004). *Findings From IEA's Trends in International Mathematics and Science Study at the Fourth and Eighth Grades*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

National Research Council [NRC]. (1996). *National science education standards*. Washington D.C.: National Academy Press.

National Science Foundation [NSF]. (2006, February). Chapter 1: Elementary and secondary education: Mathematics and science teachers. *Science and Technology Indicators 2006* Retrieved August 1, 2006, from http://www.nsf.gov/statistics/seind06/c1/c1s3.htm

O'Reilly, T., & McNamara, D. S. (2007). The impact of science knowledge, reading skill, and reading strategy knowledge on more traditional "high stakes" measures of high school students' science achievement. *American Educational Research Journal, 44*(1), 161-196.

Perrault, A. M. (2007). An exploratory study of biology teachers' online information seeking practices [Electronic Version]. *School Library Media Research*, 10. Retrieved May 1, 2007 from http://www.ala.org/ala/aasl/aaslpubsandjournals/slmrb/slmrcontents/volume10/biology.htm.

Windschitl, M., & Thompson, J. (2006). Transcending simple forms of school science investigation: The impact of preservice instruction on teachers' understandings of model-based inquiry. *American Educational Research Journal, 43*(4), 783-836.