# ACTION RESEARCH AND TECHNOLOGY EDUCATION

Chris Merrill

FEATURE ARTICLE

## Introduction

When was the last time you sat back and contemplated how effective your teaching is? When have you examined how to best teach bridge construction, $CO_2$ cars, or rocketry? What methods have you used to determine how students learn and apply their knowledge? Have you investigated the effectiveness of your newly implemented curriculum based on *Standards for Technological Literacy*? Pre-service and practicing teachers may or may not have engaged in this type of questioning or investigated what works best and why. For varying reasons, technology education, as an entire field, is lacking in these action-related, researchable areas.

There has been ongoing dialogue about the need for sustained research in technology education for many years through articles presented in technology education professional journals and conference presentations (Benenson, 2001; Cajas, 2000; Foster, 1996; Haynie, 1998; Hoepfl, 1997; Lewis, 1999; Petrina, 1998; Zuga, 1994). However, this dialogue has predominately centered upon existing faculty members in technology teacher education institutions. There has been limited discussion in technology education regarding guided pre-service, classroom teacher, or the teaching of educational research for sustained technology education growth at the practitioner-based levels (Cajas, 2000).

Why should practicing teachers care about research? Avison, Lau, Myers, and Nielsen (1999) believe that action research can provide and address solutions to real-life problems in the classroom by combining theory with practice. Action research, as stated by Calhoun (2002) "can change the social system in schools and other education organizations so that continual formal learning is both expected and supported" (p. 18). There is a gap, however, between what action research may provide the classroom teacher and what technology education researchers have discovered. Zuga (2000) noted that little research being conducted today is focused on improving technology classrooms. If little research is being conducted at the practitioner-based level, how can technology education develop and use best practices? Benenson (2001) discussed the idea that research in technology education must involve classroom teachers and university faculty—a bridge that may help fill the gap in technology education research between the two groups. More importantly, closing the gap between classroom teachers and university faculty may alleviate the frequent "in the dark" feeling, and answer the question of why practicing teachers should care about research.

**It is through practical, meaningful research and dialogue that technology education will further position itself in the mainstream of education.**

## Action Research Defined

Stephen Corey (1953) described action research as a process for practitioners to study and solve their own problems. A more formal definition and explanation of action research is:

> A continual disciplined inquiry conducted to inform and improve our practice as educators. Action research asks educators to study their practice and its context, explore the research base for ideas, compare what they find to their current practice, participate in training to support needed changes, and study the effects on themselves, their students, and colleagues (Calhoun, 2002, p.18).

Regardless of the definition of action research you find, use, or implement, the key principles of action research involve strategies to improve teaching and learning. Sagor (2000) suggested that teachers should engage in action research to: (1) build the reflective practitioner; (2) make progress on school-wide priorities; and (3) build professional cultures (p. 7). Simply put, action research is a formal process of improvement, which requires discovering, analyzing, interpreting, and acting upon what is happening in the classroom and school.

## Steps in Action Research

Like any type of research, there are general steps, procedures, or processes that one should follow. Johnson, 2002; McNiff, 2002; Quigley, 1997; and Sagor, 2000 all list their specific "plan of attack"; however, each author or plan has the same basic features in principle. McNiff outlined the following process for action research: (1) review your current practice; (2) identify an aspect you want to improve; (3) imagine a way forward; (4) try it out; (5) take stock in what happens; (6) modify your plan based on what you discovered; (7) evaluate your action; and (8) keep evaluating and changing your action until you are satisfied. Johnson's process is characterized by the following: (1) identifying a problem or research topic; (2) setting the problem or research topic in a theoretical context; (3) making a plan for data collection; (4) beginning to collect and analyze data; (5) if necessary, allowing the question or problem to change as you collect data; (6) analyzing and organizing the data; (7) reporting the idea; (8) making your conclusions and recommendations; and (9) creating a plan of action.

In an attempt to make a working process of action research, Delong (1996) presented a list of sequenced questions for classroom teachers to ask and answer, which may provide a framework for a particular action research project: (1) What is the problem? (2) What are some possible solutions? (3) What is the possible solution I want to investigate? (4) How do I make the solution work? (5) How do I record data and reflect on it? (6) How do I share my experiences with others? and (7) What is next?

Regardless of which expert model or process you embark on, action research will help you address a "burning problem or issue" that you want to investigate. Often, however, the burning problems solved by teachers are rarely reported. While action research is targeted to help you frame and act on a specific situation in your classroom, school, or community, sharing results with all technology education teachers would be beneficial. Odds are that another technology teacher has experienced, or is experiencing, the same type of problem, and your solution may help frame their action research or, even better, solve their problem.

## Technology Education Example

Wallace Shilkus, a middle school technology education teacher in Illinois, recently published a chapter in an action research text that dealt with the teaching and learning in his classroom/laboratory. Shilkus wanted to know how relevant technology education was to middle school students; whether his methods of instruction made a difference in the classroom; and whether Gardner's multiple intelligences had a role to play in the classroom. Shilkus posed the following question to himself: "How could my action research help me document my teaching methods and the benefits my students gain?" (2001, p. 144). Using $CO_2$ cars as the activity and Gardner's multiple intelligences as the theory, Shilkus discovered that his students used and were engaged in demonstrating most of the "intelligences." Throughout this process, Shilkus noticed differences in himself as the teacher and his students as the learners. Moreover, Shilkus discovered that by presenting the material and requirements of the $CO_2$ car activity in different forms, the students excelled. Wallace Shilkus' experience is just one example of how action research can have an effect on teaching and learning, and is practical in nature.

## Conclusion

Teachers engaging in action research will become more aware of the educational process, options, and possibilities for not only the classroom, but for the entire school. Johnson (1993) noted that teachers embarking on action research improve their understanding, methodology, and approach to the teaching process. Like any potential change agent, teachers doing action research will probably encounter barriers. Having time in the day, working with others, gaining support from administrators, and securing funding are all obstacles that will have to be addressed. However, all good teachers, who promote change in their professional development career, experience one or more barriers. Action research at the pre-service or practitioner levels is a logical step in helping solve topics or problems that need to be researched in technology education. It is through practical, meaningful research and dialogue that technology education will further position itself in the mainstream of education. So, what will you begin to research today?

## References


Avison, D., Lau, F., Myers, M., & Nielsen, P. A. (1999). Action research. *Communications of the ACM, 42(1),* 94-97.

Benenson, G. (2001). Teachers researching, children designing. *Journal of Technology Education, 12(2),* 56-68.

Calhoun, E. F. (2002). Action research for school improvement. *Educational Leadership, 59(6),* 18-23.

Cajas, F. (2000). Technology education research: Potential directions. *Journal of Technology Education, 12(1),* 75-85.

Corey, S. (1953). *Action research to improve school practice.* New York: Teachers College, Columbia University.

Delong, J. (1996, August). *Facilitating supporting action research by teachers and principals: Self-study of a superintendent's role.* Paper presented at the International Conference, Herstmonceux Castle, East Sussex, England.

Foster, W. T. (1996). A research agenda for technology education. *The Technology Teacher, 56(1),* 31-33.

Haynie, W. J. (1998). Experimental research in the technology education: Where is it? *Journal of Technology Education, 9(2),* 78-83.

Hoepfl, M. C. (1997). Choosing qualitative research: A primer for technology education researchers. *Journal of Technology Education, 9(1),* 47-63.

Johnson, A. P. (2002). *A short guide to action research.* Boston, MA: Allyn and Bacon.

Johnson, B. (1993). *Teacher as researcher.* Washington, DC: ERIC Clearinghouse on Teacher Education. (ERIC Document Reproduction Service No. ED 355205.)

Lewis, T. (1999). Research in technology education - some areas of need. *Journal of Technology Education, 10(2),* 41-56.

McNiff, J. (2002). *Action research principles and practice.* New York, NY: Routledge/Falmer.

Petrina, S. (1998). The politics of research in technology education: A critical content and discourse analysis of the Journal of Technology Education, Volumes 1-8. *Journal of Technology Education, 10(1),* 27-57.

Quigley, A., & Kuhne, G. W. (1997). *Creating practical knowledge through action research: Posing problems, solving problems, and improving daily practice.* San Francisco, CA: Jossey-Bass.

Sagor, R. (2000). *Guiding school improvement with action research.* Alexandria, VA: Association for Supervision and Curriculum Development.

Shilkus, W. (2001). Racing to research: Inquiry in middle school industrial arts. In G. Burnaford, J. Fischer, & D. Hobson (Eds.), *Teachers doing research: The power of action through inquiry (2nd ed., pp. 143-149).* Mahwah, NJ: Lawrence Erlbaum Associates.

Zuga, K. (2000, December). *Some thoughts on technology education research.* Presented at the American Association for the Advancement of Science, Conference on Research in Technology Education, Washington, DC.

Zuga, K. (1994). *Implementing technology education: A review and synthesis of the research literature.* Columbus, OH: Center on Education and Training for Employment.

**Chris Merrill** *is an assistant professor in the Department of Technology at Illinois State University, Normal, IL. He can be reached via e-mail at cpmerri@ilstu.edu.*

*This is a refereed article.*

## Silent Auction Winners - Albuquerque - 2004

**Evan Biddulph**, Brigham Young University, Provo, UT
**Penn State Industries**, handmade pen and case

**Laura Hummell**, Manteo Middle School, Manteo, NC
**Goodheart-Willcox Publisher**, technology teacher support kit

**Robin Kessler**, New Town High School, Baltimore, MD
**Nida Corporation**, electronic calendar/calculator and Nida sweatshirt

**Tony Korwin**, Alamogordo Public Schools, Alamogordo, NM
**Glencoe/McGraw-Hill**, classroom set of books (25), *Technology: Today and Tomorrow* ©2004

**Sid Rader**, Princess Anne High School, Virginia Beach, VA
**Autodesk**, 3ds max 6 (one year grant); Autodesk, Inventor Series (one year grant); **SolidWorks,** Computer Bag and Student Edition (24 month license-2003/2004)

**Matt Sabin**, Epsilon, Minnetonka, MN
**Lovegreen Risk Management**, motor control for machinery

**Joe Sargent**, Milford Mill Academy, Baltimore, MD
**Kelvin**, Power Pole and K.A.C. Plane

**Chris Smith**, Conestoga Valley, Lancaster, PA
**Graymark International, Inc.**, GPS-101 Electronics Trainer

**Victor Stefan**, Lake Middle School, Hartville, OH
**ITEA** Backpack

**Bart Washer**, Central Missouri State Univ., Warrensburg, MO
**Kansas City** "Here We Come" TV and VCR

**Jesse White**, Hampton City Schools, Hampton, VA
**Vernier Software & Technology**, $100 gift certificate

**Thank you to all those who bid on products, as well as the product donors, for helping to support the Foundation for Technology Education!**