Karl A. Smith is Emeritus Cooperative Learning Professor of Engineering Education, School of Engineering Education, at Purdue University. He is also Emeritus Professor of Civil, Environmental, and Geo- Engineering, Morse-Alumni Distinguished University Teaching Professor, and Faculty Member, Technological Leadership Institute at the University of Minnesota. He joined the University of Minnesota in 1972 and started his academic career as a materials processing engineering researcher. In 1991 he changed careers to focus on engineering education research and in 2006 he accepted a part time position as Cooperative Learning Professor, School of Engineering Education, Purdue University to help start the engineering education PhD program in the College of Engineering. His research and development interests include building research and innovation capabilities in engineering education; faculty and graduate student professional development; the role of cooperation in learning and design; problem formulation, modeling, and knowledge engineering; and project and knowledge management. Karl has over 40 years of experience working with faculty to redesign their courses and programs to improve student learning. He adapted the cooperative learning model to engineering education and in the past 15 years has focused on high-performance teamwork through his workshops and book *Teamwork and Project Management* (2014). His bachelor's and master's degrees are in metallurgical engineering from Michigan Technological University and his Ph.D. is in educational psychology from the University of Minnesota.

Karl was PI on the NSF Workshop: I-Corps for Learning (I-Corps-L): A Pilot Initiative to Propagate & Scale Educational Innovations, and NSF EAGER: I-Corps for Learning (I-Corps-L): Curriculum Development and Implementation. He has been co-PI on two NSF Centers for Learning and Teaching (CLT), including the Center for the Advancement of Engineering Education (CAEE), and co-PI on an NSF-CCLI-ND—Rigorous Research in Engineering Education: Creating a Community of Practice, and the NSF project COLLABORATIVE RESEARCH: Expanding and sustaining research capacity in engineering and technology education: Building on successful programs for faculty and graduate students. He serves on the National Advisory Boards for many research projects, including the NSF-CLT Center for the Integration of Research, Teaching and Learning (CIRTL); and the National Academy of Engineering's Center for the Advancement of Scholarship on Engineering Education (CASEE). He served on the National Research Council's Discipline-Based Education Research consensus study and the National Academy of Engineering Frontiers of Engineering Education planning committee.

Karl has received numerous awards, including Fellow, American Association for the Advancement of Science; Academy for Engineering Education Leadership, Michigan Technological University; Fellow, Hall of Fame and Lifetime Achievement Award, American Society for Engineering Education; Honorary Doctorate, Universiti Teknologi Malaysia; Distinguished Alumni Award, College of Education and Human Development, University of Minnesota; Distinguished Service Award, Educational Research and Methods Division, Chester F. Carlson Award for Innovation in Engineering Education, and Fellow, American Society for Engineering Education; and Ronald J. Schmitz Award for outstanding continued service to engineering education through contributions to the Frontiers in Education Conference, ERM Division of ASEE and Education Society of IEEE.

He has served as Co-Coordinator for the Bush Faculty Development Program for Excellence and Diversity in Teaching, and Associate Director for Education at the NSF-ERC Center for Interfacial Engineering at the University of Minnesota; as a member of the Board of Directors of the Collaboration for the Advancement of College Teaching and Learning; and as Chair of the Educational Research and Methods Division of the American Society for Engineering Education. Between 1999 and 2004 Karl had a split appointment with Michigan State University where he served as a Senior Consultant to the Provost for Faculty Development. During his split appointment at Michigan State University Karl was the Co-Facilitator for the Lilly Teaching Program.

Karl has published many articles on engineering education, cooperative learning and structured controversy, problem formulation and modeling, and project management and teamwork. He taught graduate courses in the School of Engineering Education at Purdue. He conducts workshops on building engineering education research and innovation capabilities, cooperative learning (especially in STEM disciplines), problem formulation and modeling, and project management and teamwork. His workshops on cooperative learning have helped thousands of faculty build knowledge, skills and confidence for involving their students in interactive and cooperative learning both during class time and outside of class. The effects of the work are significant in terms of creating a sense of belonging and membership in a community, as well as much more engaged and deep learning.

Karl has written eight books including *How to model it: Problem solving for the computer age* (with Anthony Starfield and Andrew Bleloch), first published by McGraw-Hill in 1990; *Cooperative learning: Increasing college faculty instructional productivity* (with David and Roger Johnson), published by ASHE-ERIC Reports on Higher Education in 1991; *Strategies for energizing large classes: From small groups to learning communities* (with James Cooper and Jean MacGregor) published in Jossey-Bass's New Direction for Teaching and Learning series in 2000; *Active Learning: Cooperation in the College Classroom* (with David and Roger Johnson) in 2006, and the 2014 *Teamwork and project management*, 4th Ed. published in McGraw-Hill's BEST Series.

Education

- B.S., 1969, Metallurgical Engineering, Michigan Technological University
- M.S., 1972, Metallurgical Engineering, Michigan Technological University
- Ph.D., 1980, Educational Psychology, University of Minnesota

Professional Background

- Cooperative Learning Professor, School of Engineering Education, Purdue University, 2006-2022
- Visiting professor, Department of Engineering Education, Purdue University, 2004-2005
- Senior Consultant to the Provost for Faculty Development, Michigan State University, 1998-2004
- Faculty Member, Technological Leadership Institute, University of Minnesota, 1993-2019
- Professor, Civil, Environmental, and Geo- Engineering, University of Minnesota, 1972 – 2011.

Awards and Recognition

Hall of Fame, American Society for Engineering Education, 2023
Fellow, American Association for the Advancement of Science, 2021
Academy for Engineering Education Leadership, Michigan Technological University, 2018
Lifetime Achievement Award, American Society for Engineering Education, 2015
Honorary Doctorate, Universiti Teknologi Malaysia, 2013
Distinguished Service Award, Educational Research and Methods Division, American Society for Engineering Education, 2002
Chester F. Carlson Award for Innovation in Engineering Education, American Society for Engineering Education, 2001
Fellow, American Society for Engineering Education, 1998
Ronald J. Schmitz Award for outstanding continued service to engineering education through contributions to the Frontiers in Education Conference, ERM Division of ASEE and Education Society of IEEE, 1991

Selected Books

- Smith, K.A. (2014). *Teamwork and project management, 4e.* New York: McGraw-Hill.
- Starfield, A.M., Smith, K.A. and Bleloch, A. (1990). *How to model it: Problem solving for the computer age*. Initially published by McGraw-Hill. Currently available from LAD Custom Publishing - https://buy.ladportal.com/course-pack/view/id/151

Selected Publications

- Smith, K.A. & Starfield, A.M. (2023). Reflections on modeling and teaching modeling. *The Journal of Undergraduate Mathematics and Its Applications (UMAP), 44(2).*
- Smith, K.A. & Felder, R.M. (2023). Cooperative Learning in Engineering Education: The Story of an Ongoing Uphill Climb. In Robyn Gillies, Barbara Millis, and Neil Davidson, eds. Contemporary Global Perspectives on Cooperative Learning. New York: Routledge.
- Streveler, R.A. & Smith, K.A. (2020). Opinion: Course Design in the Time of Coronavirus: Put on your Designer's CAP. *Advances in Engineering Education, Covid-19 Issue.* [https://advances.asee.org/opinion-course-design-in-the-time-of-coronavirus-put-on-your-designers-cap/]
- Pitterson, N., Allendoerfer, C., Streveler, R., Ortega-Alvarez, J., & Smith, K. (2020). The Importance of Community in Fostering Change: A Qualitative Case Study of the Rigorous Research in Engineering Education (RREE) Program. *Studies in Engineering Education*, *1*(1), 20–37. DOI: http://doi.org/10.21061/see.7
- Cheruvelil, Kendra Spence, De Palma-Dow, Angela, & Smith, Karl A. (2020) Strategies to Promote Effective Student Research Teams in Undergraduate Biology Labs. *The American Biology Teacher* 1 January 2020; 82 (1): 18–27. doi: https://doi.org/10.1525/abt.2020.82.1.18
- Smith, K.A., Matusovich, H. & Zho, T.X.P. (2015). Constructive Controversy in Engineering Undergraduate, Masters, Doctorate, and Professional Settings. In A. Vollmer, M. Dick and T. Wehner (Eds.), *Konstruktive Kontroverse in Organisationen: Konflikte bearbeiten, Entscheidungen treffen, Innovationen fördern*. Springer Gabler DOI 10.1007/978-3-658-00263-3
- Johnson, D.W., Johnson, R.T. & Smith, K.A. (2014). Cooperative Learning: Improving University Instruction By Basing Practice On Validated Theory. In Davidson, N., Major, C., & Michaelsen, L. (Eds.). (2014). Small-group learning in higher education: Cooperative, collaborative, problem-based, and team-based learning. Journal on Excellence in College Teaching, 25(4). [http://celt.miamioh.edu/ject/fetch.php?id=594]
- Chavela Guerra, R., Smith, K.A. McKenna, A.F., Swan, C., Korte, R., Jordan, S., Lande, M. and McNeal, R. (2014). Innovation Corps for Learning: Evidence-based Entrepreneurship™ to Improve (STEM) Education. ASEE/IEEE Frontiers in Education Conference. [I-Corps-L WIP FIE 2014.pdf]
- Moore, Tamara J. and Smith, Karl A. (2014). Advancing the State of the Art of STEM Integration. JSTEM Education – [Moore-SmithSTEMIntegrationJSTEMEd-15-1-2014]

- Singer, Susan and Smith, Karl A. (2013). Discipline-Based Education Research: Understanding and Improving Learning in Undergraduate Science and Engineering. Guest Editorial – [Singer-Smith-DBER-JEE-Oct_2013-jee20030.pdf]
- Gary Lichtenstein, Helen L. Chen, Karl A. Smith, and Theresa A. Maldonado (2013). Retention and Persistence of Women and Minorities Along the Engineering Pathway in the United States [Lichtenstein-Chen-Smith-Maldonado-CHEER-Ch16-Johri_Olds-Draft-8-8-13.pdf]
- Froyd, J.E., Wankat, P.C. & Smith, K.A. (2012). Five major shifts in 100 years of engineering education. *Proceedings of the IEEE, 100, 1344-1360.* Link to article – http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=06185632