TOP 5

Compiled by Phil Wankat

For the 50 years of *Chemical Engineering Education* celebration Lynn Heasley, managing editor of *CEE*, and I thought that lists of readers' favorite five articles would be a useful method to review papers in *CEE*. Members of the 2014 *CEE* Publication Board and some former members and readers of *CEE* were sent the following email or a slight variation of this email:

> *For the* CEE *special issue in 2016 celebrating 50 years of* CEE*, I am requesting that each member of the Publication Board select their top 5* CEE *pieces in the last 50 years. Please select from your favorite articles and columns in* CEE. *These selections can be papers in your research or teaching areas, homework or lab papers, Teaching Tips, or Rich Felder's columns. It would be helpful if at least one or two of your selections was from 2004 or earlier (all old issues are available on the* CEE *web page: <http://www.che.ufl.edu/cee/> and at <http://ufdc.ufl.edu/AA00000383/00170>).*

As soon as I started receiving e-mail responses (the same day I sent out the invitation), we realized that the comments of the selectors would also be of interest. I have edited the comments to remove salutations and personal notes. The citations have been put into a standard format. The comments of the respondents are included with each article. In addition to the votes from respondents we have included the articles that won the William H. Corcoran Award for best article in *CEE*. The Corcoran award is counted as one vote. The articles are listed in the order of the number of votes received. When there is a tie in the number of votes, Corcoran award winners are placed first, in alphabetical order if there are more than one. The remaining tied papers are generally placed in alphabetical order of the first author, although if the respondent connected a series of papers the papers are presented together.

A total of 125 papers either won the Corcoran award or received at least one vote from the respondents. This large number of articles rated as among the favorites illustrates both the diversity of opinion of chemical engineering faculty and the high quality of many *CEE* articles.

FIRST PLACE

The entire series "The Future of Engineering Education" by Felder, Rugarcia, Stice, and Woods has the most total votes—20 for the sum of the six parts—and part II with six votes has the highest single number of votes.

Jason Keith –*"Review paper with 232 citations!"*

Felder, R.M., Woods, D.R., Stice, J.E., and Rugarcia, A., "The Future of Engineering Education II. Teaching Methods That Work," *CEE*, **34**(1), 26 (Winter 2000).

6 votes: *Dendy Sloan, Richard Felder, Jason Keith, Milo Koretsky, Stewart Slater, Stephanie Farrell*

Stephanie Farrell – *"I liked the whole series on 'The Future of Engineering Education.' I find these to be timeless pieces to which I refer often."*

SECOND PLACE

Part I of the "Future of Engineering Education" series, with 5 votes, is second.

Don Visco – *"I felt like this introductory paper (and the other parts) were a very good read and made me think deeper about this topic, especially as I was a new assistant professor starting out."*

Rugarcia, A., Felder, R.M., Woods, D.R., and Stice, J.E., "The Future of Engineering Education. Part I. A Vision for a New Century," *CEE*, **34**(1), 16 (Winter 2000).

5 votes: *Dendy Sloan, Richard Felder, Don Visco, Stephanie Farrell, Rich Dickinson*

Rich Dickinson – *"It's tough to choose. I really enjoy reading Rich Felder's articles."*

TIED FOR THIRD PLACE

Three papers are tied for third place with four votes each.

Bird, R.B., "Hougen's Principles," *CEE*, **20**(4), 161 (Fall 1986).

4 votes: *Corcoran award, Dendy Sloan, Lisa Bullard, Phil Wankat*

Phil Wankat – *"A prescription for better departments and a better world."*

John O'Connell – *"Without deep thought, I can say my favorites were the series on structure of knowledge organized by Don Woods in 1993, and the series by Jim Haile of 'Toward Technical Understanding' during the late 1990s."*

Haile, J.M., "Toward Technical Understanding: Part I. Brain Structure and Function," *CEE*, **30**(3), 152 (Spring 1997).

4 votes: *Corcoran award, Dendy Sloan, Richard Felder, John O'Connell*

Woods, D.R., Felder, R.M., Rugarcia, A., and Stice, J.E., "The Future of Engineering Education. III. Developing Critical Skills," *CEE*, **34**(2), 108 (Spring 2000).

4 votes: *Dendy Sloan, Richard Felder, Stephanie Farrell, Stewart Slater*

TIED FOR FOURTH PLACE

There are seven papers tied for fourth place, with three votes each

(counting each part of a multi-part series as separate).

Haile, J.M., "Towards Technical Understanding. Part 2. Elementary Levels," *CEE*, **31**(4), 1997.

3 votes: *John O'Connell, Stewart Slater, Richard Felder*

Haile, J.M., "Towards Technical Understanding. Part 3. Advanced Levels," *CEE*, **32**(1), 1998.

3 votes: *John O'Connell, Stewart Slater, Richard Felder*

Clark, W., DiBiasio, D., and Dixon, A., "A Project-Based Spiral Curriculum for Introductory Courses in ChE. Part 1. Curriculum Design," *CEE*, **34**(3), 2000.

3 votes: *Corcoran award, Stewart Slater, Stephanie Farrell*

Bullard, L., and Felder, R.M., "A Student-Centered Approach to Teaching Material & Energy Balances. Part 2. Course Delivery and Assessment," *CEE*, **41**(3), 167 (Summer 2007).

3 votes: *Bill Koros, Jason Keith, Stephanie Farrell*

Bill Koros – *"passed to young faculty here who are starting up their teaching careers. The young faculty noted that these [included 1990 paper by Felder] were very helpful to them."*

Lisa Bullard – *"I refer to (this) frequently, either to share with students or to refresh myself on good teaching practice."*

Felder, R.M., "Impostors Everywhere," *CEE*, **22**(4), 168 (Fall 1988).

3 votes: *Lisa Bullard, David Silverstein, Richard Dickinson*

David Silverstein – *"Helped me better understand my self-assessment and that of my students as well. The combination of this article plus Stuart Smalley significantly impacted my professional life."*

Stice, J.E., Felder, R.M., Woods, D.R., and Rugarcia, A., "The Future of Engineering Education. IV. Learning How to Teach," *CEE*, **34**(2), 118 (Spring 2000).

3 votes: *Dendy Sloan, Richard Felder, Stephanie Farrell*

Matthew Liberatore – *"A handful of articles have given me things to consider in my teaching. I would say the 'best' paper of this bunch is Don Woods (not surprising there) covering how to teach problem solving. We still have much to learn from Don."*

Woods, D.R., "On Teaching Problem Solving. Part 1," *CEE*, **11**(2), 86 (Spring 1977).

3 votes: *Richard Felder, Matthew Liberatore, Milo Koretsky*

TIED FOR FIFTH PLACE

These papers are tied for fifth place with two votes each.

Biernacki, J.J., "A Quantitative Course-Level Strategy for Using Outcomes-Based Assessment to Guide Continuous Improvement," *CEE*, **39**(3), 186 (Summer 2005).

2 votes: *Corcoran award, David Silverstein*

David Silverstein – *"In light of ABET fallout from the first EC2000 cycle, this article gave me insight into approaches to closing the assessment cycle. While I have not gone to the same extent as the author in my assessment practices, it provided ideas and direction to focus assessment."*

Phil Wankat – *"I have used this method in sophomore to graduate level courses and it never fails."*

Felder, R.M., "The Generic Quiz: A Device To Stimulate Creativity and Higher-Level Thinking Skills," *CEE*, **19**(4), 176 (Fall 1985).

2 votes: *Corcoran award, Phil Wankat*

Lightfoot, E.N., "Evolution for Chemical Engineers," *CEE*, **30**(3), 168 (Summer 1996).

2 votes: *Corcoran award, Lisa Bullard*

Newell, J., Dahm, K., Harvey, R. and Newell, H., "Developing Metacognitive Engineering Teams," *CEE*, **38**(4), 316 (Fall 2004).

2 ***votes:*** *Corcoran award, David Silverstein*

Olds, B.M., and Miller, R.L., "Using Portfolios to Assess a ChE Program," *CEE*, **33**(2), 110 (Spring 1999).

2 votes: *Corcoran award, Jason Keith*

Prausnitz, J.M., "Chemical Engineering and the Other Humanities," *CEE*, **32**(1), 14 (Winter 1998).

2 votes: *Corcoran award, Dendy Sloan*

David Silverstein – *"I had never heard of metacognition prior to this article, and awareness of it has increased my usage of reflection and other techniques suggested by these authors (and numerous others prior to and following this article) to aid my students in increasing their awareness of it."*

Sloan, E.D., "Extrinsic Versus Intrinsic Motivation in Faculty Development," *CEE*, **23**(3), 134 (Summer 1989).

2 votes: *Corcoran award, Milo Koretsky*

Sutija, D.P., and Prausnitz, J.M., "Chemical Engineering in the Spectrum of Knowledge," *CEE*, **24**(2), 20 (Spring 1990).

2 votes: *Corcoran award, Milo Koretsky*

Vigeant, M., Prince, M., and Nottis, K., "Development of Concept Questions and Inquiry-Based Activities," *CEE*, **45**(3), 211 (Summer 2011).

2 votes: *Corcoran award, Polly Piergiovanni*

Westmoreland, P., "Chemistry and Life Sciences in a New Vision of ChE," *CEE*, **35**(4), 2001.

2 votes: *Corcoran award, Stewart Slater*

John O'Connell – *"Without deep thought, I can say my favorites were the series on structure of knowledge organized by Don Woods in 1993, and the series by Jim Haile of 'Toward Technical Understanding' during the late 1990s."*

Woods, D.R., and Sawchuk, R.J., "Fundamentals of Chemical Engineering," *CEE*, **27**(2), 80 (Spring 1993).

2 votes: *Corcoran award, John O'Connell*

David Silverstein - *"The historical perspective on my course subject matter became far more accessible and consequently incorporated into my courses due to this article and some that followed in later years."*

Bird, R.B., "Who Was Who in Transport Phenomena," *CEE*, **35**(4), 256 (Fall 2001).

2 votes: *David Silverstein, Pedro Arce*

Pedro Arce – *Paper is part of a list of five articles that '"forms a formidable core in Transport and Reaction —something that these days seems to be far from the 'ChE Core' in many departments."*

Dixon, A., Clark, W., and DiBiasio, D., "A Project-Based Spiral Curriculum for Introductory Courses in ChE. Part 2. Implementation," *CEE*, **34**(4), 296 (Fall 2000).

2 votes: *Milo Koretsky, Stewart Slater*

Part 1 (Clark, *et al*., 2000) is listed in the previous section.

Falconer, J., "Using ConcepTests and Instant Feedback in Thermodynamics," *CEE*, **38**(1), 64 (Winter 2004).

2 votes: *Milo Koretsky, Don Visco*

Don Visco – *"When I read this paper, I immediately said, 'This is what I've been thinking of.' I then convinced Pedro Arce (my chair at the time) to invest $1,000 so I can use this in my courses (and encouraged others to do so as well). I still use it today (a different brand and RF instead of IR), but John's paper was a great catalyst for me on this item."*

Felder, R.M., and Brent, R., "Learning By Doing," *CEE*, **37**(4), 282 (Winter 2003).

2 votes: *Jason Keith, Rich Dickinson*

Jason Keith – *"100 citations!"*

Haile, J.M., "Toward Technical Understanding. Part 4. General Hierarchy Based on the Evolution of Cognition," *CEE*, **34**(1), 48 (Winter 2000), and "Part 5. General Hierarchy Applied to Engineering Education," *CEE*, **34**(2), 138 (Spring 2000).

2 votes each: *Richard Felder, John O'Connell*

Singh, A., Jayaraman, A., and Hahn, J., "A Case Study Representing a Signal Transduction in Liver Cells as a Feedback Control Problem," *CEE*, **41**(3), 177 (Summer 2007).

2 votes: *Tamara Floyd Smith, Daina Briedis*

Tamara Floyd Smith– *"I used this paper for my department-head-mandated 'bio' problem for the many years that I taught our process control class."*

David Silverstein – *"A broader historical perspective on chemical engineering education was and remains exceedingly valuable as we work to impact the next generation of chemical engineering educators."*

Wankat, P.C., "History of Chemical Engineering and Pedagogy: Paradox of Tradition and Innovation," *CEE*, **43**(3), 216 (Summer 2009).

2 votes: *Dendy Sloan, David Silverstein*

Woods, D.R., "On Teaching Problem Solving. Part 2," *CEE*, **11**(3), 140 (Summer 1977).

2 votes: *Richard Felder, Matthew Liberatore*

Felder, R.M., "Stoichiometry Without Tears," *CEE*, **24**(4), 188 (Fall 1990).

2 votes: *Bill Koros, Lisa Bullard*

Bill Koros – *"The final two [other was Bullard and Felder (1990)] are related to articles by Rich Felder that I have liked, and passed to young faculty here who are starting up their teaching careers. The young faculty noted that these were very helpful to them—in fact, the last one, from 1990, helped me get started in my own career."*

PAPERS WITH ONE VOTE

In addition to the Top 5 rankings, there are 93 papers that received either the Corcoran award or one vote. First, Corcoran award winners are presented in chronological order. Remaining articles are in alphabetical order of the first author, except when the respondent commented on a series of articles the articles are listed together.

Corcoran award winners

- Sciance, C.T., "Chemical Engineering in the Future," *CEE*, **21**(1), 12 (Winter 1987).
- Kabel, R.L., "Instruction in Scaleup," *CEE*, **22**(3), 128 (Summer 1988).
- Squires, R.G., Reklaitis, G.V., Yeh, N.C., Mosey, J.F., Karimi, I.A., and Andersen, P.K., "Purdue-Industry Computer Simulation Modules. The Amoco Resid Hydrotreater Process," *CEE*, **25**(2), 98 (Spring 1991).
- de Nevers, N., and Seader, J.D., "Helping Students Develop a Critical Attitude Towards Chemical Process Calculations," *CEE*, **26**(2), 88 (Spring 1992).
- Abbot, M.M., Ariyapadi, M.V., Balsara, N., Dasgupta, S., Furno, J.S., Futerko, P., Gapinski, D.P., Grocela, T.A., Kaminsky, R.D., Karlsruther, S.G., Kiewra, E.W., Narayan, A.S., Nass, K.K., O´Connell, J.P., Parks, C.J., Roth, G.S., Rogowski, D.F., Sarsfield, M.B., Smith, K.M., Sujanani, M., Tee, J.J., and Tzouvaras, N., "A Field Guide to the Excess Functions, *CEE*, **28**(1), 18 (Winter 1994).

Ollis, D.F., "The Research Proposition," *CEE*, **29**(4), 222 (Fall 1995).

Editor's comment – Fostering creativity in grad students.

- Case, J.M., and Fraser, D.M., "The Challenges of Promoting and Assessing for Conceptual Understanding in Chemical Engineering," *CEE*, **36**(1), 42 (Winter 2002).
- Silverstein, D.L., "Increasing Time Spent on Course Objectives by Using Computer Programming to Teach Numerical Methods," *CEE*, **37**(3), 214 (Summer 2003).
- Shaeiwitz, J.A., and Turton, R., "Design Projects of the Future," *CEE*, **40**(2), 88 (Spring 2006).

Long, C., Matthews, M., and Thompson, N., "Fostering an Active Learning Environment for Undergrads: Peer-to-Peer Interactions in a Research Group," *CEE*, **41**(3), 202 (Summer 2007).

Editor's comment – The paper illustrates that research groups can be very educational.

Forbes, N., "A Module to Foster Engineering Creativity: An Interpolative Design Problem and Extrapolative Research Project," *CEE*, **42**(4), 166 (Fall 2008).

Editor's comment – This paper nicely complements Felder's (1985) generic quiz paper.

Woods, D.R., and Sheardown, H., "Ideas for Creating and Overcoming Student Silences," *CEE*, **43**(2), 125 (Spring 2009).

Editor's comment – The title is misleading—many methods for improving student learning are discussed.

- Silverstein, D., and Osei-Prempeh, G., "Chemical Process Control Course: An Inductive and Deductive Learning Experience," *CEE*, **44**(2), 119 (Spring 2010).
- Woods, D.R., "PBL: An Evaluation of the Effectiveness of Authentic Problem-Based Learning (aPBL)," *CEE*, **46**(2), 135 (Spring 2012).

One vote

Amundson, N., "American University Graduate Work," *CEE*, **21**(4), 160 (Fall 1987). 1 vote: Phil Wankat

Phil Wankat – *"A nice description of Neal's philosophy."*

- Balzhiser, R.E., "Chemical Engineering for the Seventies," *CEE*, 1**0**(1), 40 (Winter 1972). 1 vote: Milo Koretsky
- Biernacki, J.J., "A Quantitative Course-Level Strategy for Using Outcomes-Based Assessment to Guide Continuous Improvement," *CEE*, **47**(3), (Summer 2013). 1 vote: Stephanie Farrell

Bird, R.B., "Book Writing and Chemical Engineering Education: Rites, Rewards, and Responsibilities," *CEE*, **17**(4), 184 (Fall 1983). 1 vote: Phil Wankat.

Phil Wankat – *"The importance of books and how to write a book from one of the most influential book authors in chemical engineering."*

- Brent, R., and Felder, R.M., "Random Thoughts: How to Teach (Almost) Anybody (Almost) Anything," *CEE*, **40**(2), 173 (Spring 2006). 1 vote: Marcel Liauw
- Brent, R., and Felder, R.M., "Turning New Faculty Members Into Quick Starters," *CEE*, **41**(1), 51 (2007). 1 vote: Suzanne Kresta
- Bullard, L.G., and Felder, R.M., "A Student-Centered Approach to Teaching Material and Energy Balances. Part 1. Course Design," C*EE*, **41**(2), 93 (Spring 2007). 1 vote. Stephanie Farrell
- Burns, M.A., and Sung, J.C., "Design of Separation Units Using Spreadsheets," *CEE*, **30**(1), 62 (Winter 1996). 1 vote: Jason Keith

Cassano, A.E. "The Rate of Reaction: A Definition Or the Result of a Conservation Equation," *CEE*, **14**(1), 14 (Winter 1980). 1 vote: Pedro Arce

Romagnoli, J.A., Palazoglu, A., and Whitaker, S., "The Dynamics of a Stirred Tank Heater," *CEE*, **35**(1), 46 (Winter, 2001). 1 vote: Pedro Arce

Stokes, K., and Ramkrishna, D., "On the Tensorial Nature of Fluxes in Continuous Media," *CEE*, **16**(2), 82, (Spring 1982). 1 vote: Pedro Arce

Scriven, L.E., "Flow and Transfer at Fluid Interfaces. Part I: Lessons From Research," and "Part II: Models," *CEE*, **2**(3), 150 (Fall 1968) and *CEE,* **3**(1), 26 (Winter, 1969). 1 vote each: Pedro Arce

Pedro Arce – *"The attached list [included Bird (2001)] forms a formidable core in Transport and Reaction—something that these days seems to be far from the 'ChE Core' in many departments."*

Chorneyko, D.M., Christmas, R.J., Cosk, S., Dibbs, S.E., Hamielec, C.M., MacLeod, L.K., Moore, R.F., Norman, S.L., Stoankovich, R.J., Tyne, S.C., Wong, L.K., and Woods, D.R., "What Is Problem Solving?" *CEE*, **13**(3), 132 (Summer 1979). 1 vote: Phil Wankat

Phil Wankat – *"The diagram on p. 132 provides increased insight as one studies it more."*

- Christensen, J.J., "Reflections on Teaching Creativity," *CEE*, **22**(4), 170 (Fall 1988). 1 vote: Milo Koretsky
- Dai, L.L., "Incorporating Six Sigma Methodology Training Into Chemical Engineering Education," *CEE*, **41**(1), 53 (Winter 2007). 1 vote: Daina Briedis.
- Davis, R., and Sandall, O., "A Simple Analysis for Gas Separation Membrane Experiments," *CEE*, **37**(4), 74 (Winter 2003). 1 vote: Bill Koros
- Department Profile "ChE at Rowan University," *CEE*, **39**(2), 82 (Spring 2005). 1 vote: Marcel Liauw
- Falconer, J.L., Degrazia, J., Medlin, J.W., and Holmberg, M.P., "Using Screencasts in ChE Courses," *CEE*, **43**(4), 302 (Winter 2009). 1 vote: Jason Keith

Felder, R.M., "Cheating—An Ounce of Prevention…Or The Tragic Tale of the Dying Grandmother," *CEE*, **19**(1), 12 (Winter 1985). 1 vote: Phil Wankat

Phil Wankat – *"The master discussing an important problem with his usual wit and grace."*

- Felder, R.M., "Learning Styles Series," 1 vote: Suzanne Kresta

  Felder, R.M., "Meet Your Students: 1. Stan and Nathan," *CEE*, **23**(2), 68 (Spring 1989).

  Felder, R.M., "Meet Your Students: 2. Susan and Glenda," *CEE*, **24**(1), 7 (Winter 1990).

  Felder, R.M., "Meet Your Students: 3. Michelle, Rob, and Art," *CEE*, **24**(3), 130 (Summer 1990).

  Felder, R.M., "Meet Your Students: 4. Jill and Perry," *CEE*, **25**(4), 196 (Fall 1991).

  Felder, R.M., "Meet Your Students: 5. Edward and Irving," *CEE*, **28**(1), 36 (Winter 1994).

  Felder, R.M., "Meet Your Students: 6. Tony and Frank," *CEE*, **29**(4), 244 (Fall 1995).

  Felder, R.M., "Meet Your Students: 7. Dave, Martha, and Roberto," *CEE*, **31**(2), 106 (1997).
- Felder, R.M., "We Hold These Truths to Be Self-Evident," *CEE*, **25**(2), 80 (Spring 1991). 1 vote: Suzanne Kresta
- Felder, R.M., "On-the-Job Training," *CEE*, **42**(2), 96 (Spring 2008). 1 vote: Suzanne Kresta

Felder, R.M., "How About a Quick One?" *CEE*, **26**(1), 18 (Winter 1992). 1 vote: Don Visco

Don Visco – *"I think this is a great paper that shows how quickly and easily such effective approaches can be used...and that they have been discussed for at least the last 20 years. I gave a little teaching workshop for the new faculty in our college in January and I have included this paper."*

- Felder, R.M., and Brent, R., "FAQS. II: Active Learning vs. Covering the Syllabus and Dealing With Large Classes," *CEE*, **33**(4), 276 (Winter 1999). 1 vote: Jason Keith
- Felder, R.M., "Memo To Students Who Have Been Disappointed With Their Test Grades," *CEE*, **33**(2), 136 (1999). 1 vote: Lisa Bullard
- Felder, R.M., "We Never Said It Would Be Easy," *CEE*, **29**(1), 32 (Winter 1995). 1 vote: Lisa Bullard
- Felder, R.M., "Any Questions?" *CEE*, **28**(3), 174 (1994). 1 vote: Lisa Bullard
- Felder, R.M., "Things I Wish They Had Told Me," *CEE*, **28**(2), 108 (Spring 1994). 1 vote: Rich Dickinson.
- Felder, R.M., and Brent, R., "Is Technology a Friend or Foe of Learning?" *CEE*, **34**(4), 326 (Fall 2000). 1 vote: Milo Koretsky

Felder, R.M., Rugarcia, A., and Stice, J.E., "The Future of Engineering Education. Part. V. Assessing Teaching Effectiveness and Educational Scholarship," *CEE*, **34**(3), 198 (Summer 2000). 1 vote : Stephanie Farrell

Felder, R.M., Stice, J.E., and Rugarcia, A., "The Future of Engineering Education. Part VI. Making Reform Happen," *CEE*, **34**(3), 208 (Summer 2000). 1 vote: Stephanie Farrell

Stephanie Farrell – *"I liked the whole series on 'The Future of Engineering Education.' I find these to be timeless pieces to which I refer often. Of these, my top choice would be the last one, 'Making Reform Happen.'"*

- Felder, R.M., "The Scholarship of Teaching," *CEE*, **34**(2), 144 (2000). 1 vote: Stewart Slater
- Felder, R.M., "Random Thoughts: How to Survive Engineering School," **37**(4), 30 (Winter 2003). 1 vote: Polly Piergiovanni
- Felder, R.M., "Random Thoughts: Screens Down, Everyone!" *CEE*, **39**(3), 200 (Summer 2005). 1 vote: Marcel Liauw
- Felder, R.M., "Sermons for Grumpy Campers," *CEE*, **41**(3), (Summer 2007). 1 vote: Daina Briedis
- Ford, L., "Water Day. An Experiential Lecture For Fluid Mechanics," *CEE*, **37**(3), (Summer 2003). 1 vote: Daina Briedis
- Friedly, J.C., "Top Ten Ways to Improve Technical Writing," *CEE*, **38**(1), 54 (Winter 2004). 1 vote: Tamara Floyd Smith
- Griffith, D.E., "Designing Core Curricula Based on Principles of Learning," *CEE*, **1**(3), 31 (Summer 1962). 1 vote: Milo Koretsky
- Hearing, E.R., and Marton, J.B., "Introducing Behavioral Science Into an Engineering Laboratory," *CEE*, **12**(1), 74 (Winter 1974). 1 vote: Milo Koretsky
- Holles, J., "Old Dead Guys—Using Activity Breaks to Teach History," *CEE*, **43**(2), 150 (Spring 2009). 1 vote: Polly Piergiovanni

Hubbard, D., "Instruction By the PSI Method in a Required Senior Course," *CEE*, **14**(2), 76 (Spring 1976). 1 vote: Milo Koretsky

Milo Koretsky – *"This paper is the first I would classify as 'Chemical Engineering Education Research.' "*

- Keith, J., Silverstein, D.L., and Visco, D., "Ideas to Consider for New Chemical Engineering Educators, Part 1: Courses Offered Earlier in the Curriculum," *CEE*, **43**(3), 207 (2009). 1 vote: Rich Dickinson

Kyle, B. "The Mystique of Entropy," *CEE*, **22**(2), 92 (Spring 1988). 1 vote: Don Visco

Don Visco – *"As a thermodynamicist, I am partial to those who contemplate entropy. I remember reading this as a graduate student and I did recite the poem at the Summer School in 2007...."*

- Levenspiel, O., "Changing Attitudes to Reactor Design," *CEE*, **5**(3), 55 (Summer 1966). 1 vote: Milo Koretsky

Lih, M.M., and Foresti, R., Jr., "Innovation and Motivation—A Freshman Design Course," C*EE*, **4**(1), 44 (Winter 1970). 1 vote: Matthew Liberatore

Matthew Liberatore – *"[The authors] cover teaching and motivating students [in a way] that is mostly timeless (and involves many techniques in the current active-learning toolbox)."*

- Miller, R.L., Ely, J.F., Baldwin, R.M., and Olds, B.M., "Higher-Order Thinking in the Unit Operations Laboratory," *CEE*, **32**(2), (Spring 1998). 1 vote: Stephanie Farrell
- Miller, R.L., Streveler, R.A., Yang, D., and Santiago Roman, A.I., "Identifying and Repairing Student Misconceptions in Thermal and Transport Science," *CEE*, **45**(3), 203 (Summer 2011). 1 vote: Polly Piergiovanni

Oh, D.H. (Lindsey), and Akers, W., "Learning in Industry: Heat Transfer Analysis and the Path Forward in a Student Project on the Splenda® Sucralose Process," *CEE*, **39**(4), 316 (Fall 2005). 1 vote: Bill Koros

Bill Koros (former editor of Learning in Industry section) – *"I have gotten good comments from people about that one."*

- Olds, B.M., and Miller, R.L., "Using Portfolios to Assess a ChE Program," *CEE*, **33**(2), 110 (Spring 1999). 1 vote: Jason Keith.

Newell, J.A., Ludlow, D.K., and Sternberg, S.P.K., "Development of Oral and Written Communication Skills: Across an Integrated Laboratory Sequence," *CEE*, **31**(2), 116 (Spring 1997). 1 vote: Jason Keith

Jason Keith – *"38 citations!"*

- Prausnitz, J.M., "Toward Encouraging Creativity in Students," *CEE*, **19**(1), 22 (Winter 1985). 1 vote: Milo Koretsky
- Prince, M., Borrego, M., Henderson, C., Cutler, S., and Froyd, J., "Use of Research-Based Instructional Strategies in Core Chemical Engineering Courses," *CEE*, **47**(1), 27 (Winter 2013). 1 vote: Milo Koretsky
- Rhinehart, R.R., "The Industrialization of a Graduate. Part I: The Business Arena," *CEE*, **21**(1), 18 (Winter, 1987). 1 vote: Lisa Bullard

Rosen, E.M., and Henley, E.J., "The New Stoichiometry," *CEE*, **2**(3), 120 (Summer 1968). 1 vote: Matthew Liberatore [Editor's note: Numbering of early issues is confusing since the numbering started over with Volume 1, Number 1 in October 1965.]

Matthew Liberatore – *"As teaching material and energy balances is a favorite topic of mine, it was great to see the thought process of the course over the years and how thinking evolves and changes every few years."*

- Walker, C.A., and Delgass, W.N., "Stoichiometry of a City," *CEE*, **6**(3), 124 (Summer 1972). 1 vote: Matthew Liberatore

Lacksonen, J.W., "Material Balance Calculations With Reaction. Steady-State Flow Processes," *CEE*, **13**(2), 92 (Spring 1979). 1 vote: Matthew Liberatore

Matthew Liberatore – *"In addition, there are many [stoichiometry papers] by Felder, Bullard, and myself in more recent years. This could be an interesting review article."*

Russell, T.W.F., and Frankel, D.S., "Teaching the Basic Elements of Process Design With a Business Game," *CEE*, **12**(1), 18 (Winter 1978). 1 vote: Matthew Liberatore

Matthew Liberatore – *"Fraser Russell was gamifying ChE as early as 1978."*

Schmidt, A.X., and Pfeffer, R., "Chemical Engineering Professorial Staff as a Function of Student Load," *CEE*, **1**(1), 13 (October 1965). 1 vote: Phil Wankat

Phil Wankat – *"Their formula to determine number of professors required still appears to work reasonably well:*

ChE Professors = a + b (# BS graduates) + c (# MS Graduates) + d (# PhD graduates)

With a = 2.2, b = 0.1, c = 0.14, and d = 0.45 (0.6 for research-intensive programs)

Although the required number of professors has not changed significantly, the duties of professors have changed at research universities. Professors currently spend more time on research and less time teaching undergraduates."

- Smith, W.R., and Missen, R.W., "What Is Chemical Stoichiometry?" *CEE*, **13**(1), 26 (Winter 1979). 1 vote: Jason Keith

Editor's comment – Another stoichiometry paper to add to Rosen and Henley (1968) and Lacksonen (1979).

Snyder, J.R., "The Overhead Projector … a Teaching Aid," *CEE*, **1**(1), 11 (October 1965). 1 vote: Matthew Liberatore

Matthew Liberatore – *"...best practices on using an overhead projector and many of these ideas still apply today (although our technology is different)."*

- Squires, R.G., and Frank, D.W., "Supplemental TV Taped Problems," *CEE*, **21**(3), 117 (Summer 1987). 1 vote: Milo Koretsky
- Streicher, K.W., Fraser, D.M., Case, J.M., and Linder, C., "Learning Through Simulation: Student Engagement," *CEE*, **39**(4), 288 (Fall 2000). 1 vote: Milo Koretsky

Tiller, F., "Self-Instruction in Thermodynamics," *CEE*, **9**(3), 115 (Summer 1975). 1 vote: Matthew Liberatore

Matthew Liberatore – "*...discusses self-instruction in thermodynamics, which is a clear predecessor to peer instruction."*

50th Anniversary Issue

Wankat, P.C., "Teaching Separations," *CEE*, **35**(3), 168 (Summer 2001). 1 vote: Don Visco

Don Visco – *"When I was at Tennessee Tech, I used to teach the Thermodynamics course and the faculty member who taught before me taught separations in the same room. I remember erasing material from the board and then thinking to myself, 'I am going to teach the same thing in two weeks to the same students.' This led to merging the solution thermodynamics course with part of separations to be called 'Separations and Solution Thermodynamics.' Since I was scheduled to teach that, I had to think about which separation experiments to run in this class (and what would be run in a later lab course). This article was exactly what I (and the faculty) needed as we considered the course content."*

- Wankat, P.C., "Pedagogical Training and Research in Engineering Education," *CEE*, **42**(4), 203 (Fall 2008). 1 vote: Milo Koretsky
- Wankat, P.C., "Separations: A Short History and a Cloudy Crystal Ball," *CEE*, **43**(4), 286 (2009). 1 vote: Stewart Slater

Woods, D., Ed., "Knowledge Structure Special Issue," *CEE*, **27**(2), (Spring 1993) 1 vote: John P. O'Connell

Woods, D.R., and Sawchuk, R.J., [see 5th place]

Churchill, S.W., "Mathematics," p. 86.

Felder, R.M., "Stoichiometry," p. 92.

O'Connell, J.P., "Thermodynamics," p. 96.

Bird, R.B., "Transport Phenomena," p. 102.

Fogler, H.S., "Chemical Reaction Engineering," p. 110.

John O'Connell – *"Without deep thought, I can say my favorites were the series on structure of knowledge organized by Don Woods in 1993, and the series by Jim Haile."* [see 3rd place]

- Woods, D.R., Kourti, T., Wood, P.E., Sheardown, H., Crowe, C.M., and Dickson, J.M., "Assessing Problem-Solving Skills: Part 1: The Context for Assessment," *CEE*, **35**(4), 300 (2001). "Part 2: Assessing the Process of Problem Solving," *CEE*, **36**(1), 60 (2002). 1 vote each: Suzanne Kresta
- Zydney, A., "Analysis of Membrane Processes," *CEE*, **37**(4), 33 (Winter 2003). 1 vote: Bill Koros

DISCUSSION: GENERAL COMMENTS FROM RESPONDENTS

These comments are listed in the order received.

Tamara Floyd Smith – *"I am only sending two because they stand out as the most impactful for me."*
[Editor's note: Tamara responded within two hours of receiving my email.]

Phil Wankat – *"I picked papers from the 1970s and 1980s to avoid conflicts of interest with editorial decisions I made when I became associate editor. I have cited all of these articles in various publications."*

Dendy Sloan – *"Many thanks for suggesting a review of* Chemical Engineering Education*, since its inception in 1962, in order to select five favorite articles. This process has been a pleasant, existential experience to review the pedagogical history of our profession over the last half-century. It was difficult to avoid the temptation of choosing from very popular, outstanding sources such as the Felder/Brent Random Thoughts columns, or the articles of the current journal editor. Because those articles are so thoughtful and well-written, no one needs to highlight them for the* CEE *readership. I hope the authors of those articles will forgive me, with only the justification that five, perhaps lesser-known articles, deserve consideration."*

Rich Felder – *"In going through the journal, I found a number of interesting papers but eliminated most of them because after a while, one paper on the unit operations lab or the second law of thermodynamics looks pretty much like every other one. In the end, I decided that three multi-paper series had a greater influence on me and my teaching than anything else in the journal."*

"In my wanderings I also came across the very first published work of mine in the field of chemical engineering education—a 'Problem for Teachers' on p. 178 of the Fall 1970 issue. I'm amazed that Ray Fahien chose to publish it."

Jason Keith – *"I couldn't limit myself to five. Here are my top nine in chronological order."*

Don Visco – *"Here are the five articles from* CEE *that have been my favorites/most useful."*

Milo Koretsky – *"I have attached a draft of my selections for my favorite* CEE *pieces. I deviated from the "assignment" a bit. For 2000 – 2013, I have been an avid reader of* CEE *and picked the five papers that have most influenced me. That was easy. For 1962 – 1999, I went through the archives and identified papers that in hindsight I thought were particularly prescient. (I actually found a couple that will provide nice refs for a paper I am working on.) I was going to reconcile these, but I am having trouble since my perspectives are so different—so I have provided five in each group! I also have a list of 'honorable mention' identified through the process, but (it) did not make either top five."*

Lisa Bullard – *"I will be very interested to see what articles the group nominates!"*

Matthew Liberatore – *"I started at the beginning and have skimmed through all of the issues through 1985. A handful of articles have given me things to consider in my teaching…. I hope my input is helpful. I will probably continue to go through the remaining issues as time allows."*

Daina Briedis – *"OK, this was easier than I thought. Here are my top five in the sense that I have used the information in my teaching or have gotten a good laugh."*

Marcel Liauw – *"I have already three papers logged in, which I had downloaded long ago and keep referring to in my work in one way or the other."*

Rich Dickinson – *"It's tough to choose."*

Suzanne Kresta – *"I have given this some thought, and there are many useful articles in* CEE. *The ones that stand out are the big-picture ones which changed my way of thinking—and teaching—in many courses."*

Stewart Slater – *"I've provided below my selections for 'favorite' articles/columns from* CEE. *I provided more than five, and if you wish, I can reduce. These may not be exactly what I would pick today if I had never read an earlier issue, but at the time I first read the article, or the article was recommended to me by a colleague, they are the ones that come to mind as being very insightful, useful, or informative. These are not ranked in any order. I specifically tried to identify the early ones to try to get you the <2004 ones. Seems like volume 34 was my favorite!!"*

CLOSURE

If you have read this far and your favorite *CEE* papers were not included, send me an email at wankat@purdue.edu listing your favorites and the reasons why they are your favorites. *CEE* will consider publishing an addendum to this paper listing the additional favorite articles. ❐