

# Meta-analysis of the effectiveness of four adult learning methods and strategies: Supplemental tables and references<sup>a</sup>

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## Abstract

The effectiveness of four adult learning methods (accelerated learning, coaching, guided design, and just-in-time training) constituted the focus of a meta-analysis. Six operationally defined adult learning method characteristics were used to code and analyze the relationship between the characteristics and the study outcomes (learner knowledge, skills, attitudes, and self-efficacy beliefs). The six characteristics were instructor introduction and illustration of new knowledge or practice, and learner application, evaluation, reflection, and self-assessment of mastery of the knowledge or practice. The synthesis included 58 randomized controlled design studies (N = 2,095 experimental group participants and N = 2,213 control group participants). Results showed that all six adult learning method characteristics were associated with positive learner outcomes, but that methods and practices that actively involved learners in acquiring, using, evaluating, and reflecting on new knowledge or practice had the most positive consequences on learner outcomes. Results also showed that the adult learning methods were most effective when 5 or 6 of the adult learning characteristics were used as part of instruction or training, and the interventions were implemented with a small number of learners (< 30) for more than 10 hours on multiple occasions. Implications for research and professional development are described.

## Supplemental Material

The reference section of this supplement includes the complete list of studies included in the meta-analysis (Dunst, Trivette, & Hamby, 2010). The reference section also includes the citations for the dependent measures used in the studies if included in other than the original research reports.

Table 1 includes selected information about the study participants, the adult learning methods in each study, the learners, and the outcomes constituting the focus of analysis. The unit of participant randomization (individual vs. group) to the experimental and control or comparison group conditions is also shown in Table 1.

The adult learning method characteristics and the particular practices that constituted the focus of investigation in each of the studies are included in Table 2. Table 2 also includes the number of hours the experimental interventions were conducted in each study.

Table 3 includes the outcomes constituting the focus of analysis in each of the studies and the Cohen's *d* effect sizes for the post test differences between the experimental and control or comparison groups.

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<sup>a</sup> Supplement to a paper published in the *International Journal of Continuing Education and Lifelong Learning*, 2010, Vol. 3, No. 1, 91-112.

(The average effect sizes and 95% confidence intervals associated with each of the six adult learning method characteristics are included in Table 2 the published report; Dunst et al., 2010).

The average effect sizes, 95% confidence intervals, and Z statistics for the sizes of effect between the six adult learning method characteristics and the four different types of study outcomes are shown in Table 4. A significant Z statistic indicates that the average effect size for the relationship between the adult learning method characteristics and the learner outcomes is greater than zero. Table 5 includes the results from the moderator analyses examining the extent to which the post-test differences were affected by study, learner, and instructional variable differences. The adult learning method characteristics were all significantly related to the study outcomes regardless of the moderator albeit differentially except for type of study.

The material included in this journal supplement provides readers additional information for understanding the synthesis methodology and the ways in which the studies were coded and data analyzed (Dunst et al., 2010). This information together with the tables and figures included in the published journal article are the complete set of material that were used in the conduct the meta-analysis and the interpretation of the findings.

#### References

- Anderson, L. D., & Render, G. F. (1987). The effects of Superlearning on retention/hypermnnesia of rare English words in college students. *Journal of the Society for Accelerative Learning and Teaching*, 12(1, 2), 3-13. (ERIC Document Reproduction Service No. ED362045).
- Baker, R. G. (1983). The contribution of coaching to transfer of training: An extension study. *Dissertation Abstracts International*, 44(11), 3260 (UMI No. 8403713).
- Bartley, R. (1997). The effects of access to test item pools on student achievement and student study habits. *Dissertation Abstracts International*, 58(02), 0368A (UMI No. 9722593).
- Bass, J. A. F. (1985). The effects of the suggestive-accelerative learning and teaching method and a structural analysis method on vocabulary learning. *Dissertation Abstracts International*, 47(01), 0135A. (UMI No. 8606022).
- Benedict, J. O., & Anderton, J. B. (2004). Applying the just-in-time teaching approach to teaching statistics. *Teaching of Psychology*, 31, 197-199.
- Bing-You, R. G., Bertsch, T., & Thompson, J. A. (1998). Coaching medical students in receiving effective feedback. *Teaching and Learning in Medicine*, 10, 228-231.
- Bodine, B. (1978). Development of biochemistry activities and laboratory experiences for nursing students based on clinical cases and using the guided design approach. *Dissertation Abstracts International*, 39(08), B3804. (UMI No. 7902809).
- Bowman, C. L., & McCormick, S. M. (2000). Comparison of peer coaching versus traditional supervision effects. *Journal of Educational Research*, 93, 256-261.
- Bradner, D. A. (1996). Accelerated learning methodology applied to a corporate training program. *Dissertation Abstracts International*, 57(06), 2318A. (UMI No. 9635313).
- Bullard, B. D. (1986). Linear communications and signal processing: A guided-design approach. *Dissertation Abstracts International*, 48(03), A0634. (UMI No. 8713582).
- Byrnes, H., Buck, K., & Thompson, I. (1989). *The ACTFL Oral Proficiency Interview: Tester training manual*. New York: American Council on the Teaching of Foreign Languages.

- Cain, D. W., Rudd, L. C., & Saxon, T. F. (2007). Effects of professional development training on joint attention engagement in low-quality childcare centers. *Early Child Development and Care*, 177, 159-185.
- Campbell, C. M. (1986). The effects of guided design instruction on foreign language learning (Doctoral dissertation, Purdue University, 1986). *Dissertation Abstracts International*, 47(09), 3292A.
- Caux, P. (1995). Accelerated learning in a beginning college-level French class at the University of Houston. *Journal of Accelerative Learning and Teaching*, 20, 1-26.
- Clerici-Arais, M., Maier, M., & Simkins, S. (2003, January). *Using just-in-time teaching techniques in the principles of economics course: A preliminary report*. Paper presented at the Allied Social Science Association Meetings, Washington, DC.
- Coker, J. G., & Coker, H. (1982a). *Classroom observations keyed for effectiveness research: Observer training manual* (Rev. ed.). Atlanta: Georgia State University/ Carroll County Teachers Corps Project.
- Coker, J. G., & Coker, H. (1982b). *Classroom observations keyed for effectiveness research: User's manual*. Atlanta: Georgia State University/ Carroll County Teachers Corps Project.
- Craven, H. H. (1990). The relationship of peer coaching to the frequency of use of effective instructional behaviors in inservice teachers in three selected junior high schools. *Dissertation Abstracts International*, 51(05), 1491A. (UMI No. 9028508).
- Dipamo, B., & Job, R. F. S. (1991). A methodological review of studies of SALT (Suggestive-accelerative learning and teaching) techniques. *Australian Journal of Educational Technology*, 7, 127-143.
- Dolan, J. G. (1999). A method for evaluating health care providers' decision making: The Provider Decision Process Assessment Instrument. *Medical Decision Making*, 19, 38-41.
- Dunst, C. J., Trivette, C. M., & Hamby, D. W. (2010). Meta-analysis of the effectiveness of four adult learning methods and strategies. *International Journal of Continuing Education and Lifelong Learning*, 3(1), 91-112.
- Eastman, V. (1993). The effects of music and imagery on learning and attitudes in an industry training class. *Journal of the Society for Accelerative Learning and Teaching*, 18(3-4), 305-340. (ERIC Document Reproduction Service No. ED386910).
- Educational Testing Service. (2008). *Test of English as a foreign language*. Princeton, NJ: Author.
- Gattellari, M., Donnelly, N., Taylor, N., Meerkin, M., Hirst, G., & Ward, J. E. (2005). Does 'peer coaching' increase GP capacity to promote informed decision making about PSA screening? A cluster randomised trial. *Family Practice*, 22, 253-265.
- Goker, S. D. (2006). Impact of peer coaching on self-efficacy and instructional skills in TEFL teacher education. *System*, 34, 239-254.
- Goldberg, F. M., & Shuman, J. C. (1984a). Using guided design in a physical science course. *Journal of College Science Teaching*, 13, 350-355.
- Goldberg, F. M., & Shuman, J. C. (1984b). Using guided design to help students learn about the energy problem. *Journal of College Science Teaching*, 14, 122-127.
- Goldsmith, D., Davis, R. B., & Safran, C. (2000). Using just-in-time education to enhance the outcomes of care. In V. K. Saba (Ed.), *Nursing informatics 2000: One step beyond: The evolution of technology and nursing* (pp. 88-95). Auckland, New Zealand: Adis International.

- Hancock, B. W., Jr. (1981). The effect of guided design on the critical thinking ability of college level administrative science students (Doctoral dissertation, Southern Illinois University, 1981). *Dissertation Abstracts International*, 42, 4275.
- Hepner, F. S. (1989). Effects of guided design with and without teacher support on the accuracy in formulating nursing care plans and clinical problem solving by student nurses (Doctoral dissertation, University of Georgia, 1989). *Dissertation Abstracts International*, 50, 2336.
- Hoggard, P. E. (1980). A guided design approach to teaching general chemistry. *Journal of Chemical Education*, 57, 299.
- Hosack-Curlin, K. (1988, April). *Measuring the effects of a peer coaching project*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED303883).
- Hursh, D. E., VanArsdale, C. B., Medio, F. J., McAvoy, R., & Wales, C. E. (1980). The effects of guided design on decision-making skills. In C. E. Wales (Ed.), *Proceedings for a national conference on teaching decision-making: Guided design* (pp. 6.1-6.5). Morgantown, WV: University of West Virginia.
- Landers, R. R. (1975). Evaluation of guided design in a technology course. *Dissertation Abstracts International*, 36(04), 2122A. (UMI No. 7521928).
- Loucks, S. F., Newlove, B. W., & Hall, G. E. (1975). *Measuring levels of use of the innovation: A manual for trainers, interviewers, and raters*. Austin: University of Texas, Research and Development Center for Teacher Education.
- McGinty, R. L. (1988). *Robert's rules for optimal learning: Model development, field testing, implications!* Unpublished manuscript. (ERIC Document Reproduction Service No. ED296660).
- Metcalf, K. (1989). *An investigation of the efficacy of a research-based regimen of skill development on the instructional clarity of preservice teachers*. Unpublished doctoral dissertation, Ohio State University, Columbus, OH.
- Miller, W. R., & Mount, K. A. (2001). A small study of training in motivational interviewing: Does one workshop change clinician and client behavior? *Behavioral and Cognitive Psychotherapy*, 29, 457-471.
- Miller, W. R., Yahne, C. E., Moyers, T. B., Martinez, J., & Pirritano, M. (2004). A randomized trial of methods to help clinicians learn motivational interviewing. *Journal of Consulting and Clinical Psychology*, 72, 1050-1062.
- Moreno-Montalvo, M. M. (1987). Developing communicative competence through Suggestopedia techniques: An exploratory project with first year college ESL students. *Dissertation Abstracts International*, 49(01), 0084A. (UMI No. 8804267).
- Newsome, G. G., & Tillman, M. H. (1990). Effects of guided design and lecture teaching strategies on knowledge recall and on problem-solving performance of student nurses. *Nursing Diagnosis*, 1(3), 89-96.
- Peterson, J. E. (1995). A study of accelerated learning techniques in management skills training using videoconferencing as a delivery system (Doctoral dissertation, University of Oklahoma, 1996). *Dissertation Abstracts International*, 57, 1443.
- Pierce, T., & Miller, S. P. (1994). Using peer coaching in preservice practica. *Teacher Education and Special Education*, 17, 215-223.

- Portes, P. R., Best, S. M., Sandhu, D., & Cuentas, T. (1992). Relaxation training effects on anxiety and performance. *Journal of the Society for Accelerative Learning and Teaching*, 17(1&2), 117-148.
- Prichard, A. (1990). A SALT pilot study in college developmental mathematics. *Journal of the Society for Accelerative Learning and Teaching*, 15(1,2), 37-44. (ERIC Document Reproduction Service No. ED347789).
- Purdom, D. M. (1984). A design for planning instruction. *Florida Journal for Supervision and Curriculum Development*, 2(2), 5-9.
- Robinett, E. A. (1976). The effects of Suggestopedia in increasing foreign language achievement (Doctoral dissertation, Texas Tech University, 1975). *Dissertation Abstracts International*, 36, 7217A.
- Schiffler, L. (1986). Music in teaching French by Suggestopaedia. In R. Freudenstein & C. V. James (Eds.), *Confidence through competence in modern language learning: Selection of papers from the world conference of the International Federation of Modern Language Teachers* (CILT Reports and Papers 25) (pp. 117-128). London, UK: Centre for Information on Language Teaching and Research. (ERIC Document Reproduction Service No. ED346733).
- Schuster, D. H. (1976). A preliminary evaluation of the suggestive-accelerative Lozanov method in teaching beginning Spanish. *Journal of Suggestive-Accelerative Learning and Teaching*, 1, 41-47.
- Shaw, K. D. (1980). Guided design in the microcomputer and accounting systems course: An experimental approach. In C. E. Wales (Ed.), *Proceedings for a national conference on teaching decision-making: Guided design* (pp. 21.1-21.8). Morgantown, WV: University of West Virginia.
- Showers, B. (1982, December). *Transfer of training: The contribution of coaching*. Eugene: University of Oregon, College of Education, Center for Educational Policy and Management (ERIC Document Reproduction Service No. ED231035).
- Simkins, S., & Maier, M. (2004). Using just-in-time teaching techniques in the principles of economics course: Draft [Electronic version]. *Social Science Computer Review*, 22, 444-456.
- Slunt, K. M., & Giancarlo, L. C. (2004). Student-centered learning: A comparison of two different methods of instruction. *Journal of Chemical Education*, 81, 985-988.
- Snyder, S. (1980). Guided design in nursing: An effective teaching process. In C. E. Wales (Ed.), *Proceedings for a national conference on teaching decision-making: Guided design* (pp. 28.1-28.6). Morgantown, WV: University of West Virginia.
- Spielberger, C. D., Gorusch, R. L., & Lushene, R. E. (1970). *STAI manual for the State-Trait Anxiety Inventory ("self-evaluation questionnaire")*. Tallahassee, FL: Consulting Psychologists Press.
- Stahl, N. A., Brozo, W. G., Smith, B. D., Henk, W. A., & Commander, N. (1991). Effects of teaching generative vocabulary strategies in the college developmental reading program. *Journal of Research and Development in Education*, 24, 24-32.
- Stein, B. L., Hardy, C. A., & Totten, H. L. (1982). The use of music and imagery to enhance and accelerate information retention. *Journal of the Society for Accelerative Learning and Teaching*, 7, 341-355.
- Weil, M., Gullion, C., & Cole, D. (1971). *The teacher's innovator skills and strategies interaction system*. Unpublished manuscript.

Wynn, M. J. (1987). Student teacher transfer of training to the classroom: Effects of an experimental model. *Dissertation Abstracts International*, 47(08), 3008A. (UMI No. 8627238).

Zeiss, P. A. (1984). A comparison of the effects of SuperLearning techniques on the learning of English as a second language. *Journal of the Society for Accelerative Learning and Teaching*, 9(2), 93-101. (ERIC Document Reproduction Service No. ED267610).

**Table 1**  
**Number of Study Participants and Learner Characteristics, Settings, and Outcomes**

Study	Sample Size <sup>a</sup>		Unit of Randomization	Adult Learning Method <sup>c</sup>	Learner Description	Setting	Learner Outcome
	E	C					
Anderson & Render (1987) Study 1	56 23 26 20	54 <sup>b</sup>	Group	AL	Undergraduate students	College classroom	Rare vocabulary
Anderson & Render (1987) Study 2							
Anderson & Render (1987) Study 3							
Anderson & Render (1987) Study 4							
Baker (1983)	4	7	Individual	CH	Teachers	Junior high school	Teaching models
Bartley (1997)	24	26	Group	JIT	Undergraduate students	College classroom	Microcomputers
Bass (1985) Study 1	19 19	20 <sup>b</sup>	Individual	AL	Undergraduate students	College classroom	Rare vocabulary
Bass (1985) Study 2							
Benedict & Anderton (2004)	56	67	Group	JIT	Undergraduate students	College classroom	Statistics
Bing-You et al. (1998)	36	41	Individual	CH	Medical students	Hospital	Effective feedback from residents/physicians
Bodine (1978)	75	62	Group	GD	Undergraduate students	College classroom	Biochemistry
Bowman & McCormick (2000)	16	16	Individual	CH	Pre-service teachers	Elementary school	Instructional strategies and pedagogical models
Bradner (1996)	36	26	Group	AL	Customer service	New employee orientation workshop	Telephone customer service
Bullard (1986)	12	11	Individual	GD	Undergraduate students	College classroom	Electrical engineering
Cain et al. (2007)	24	24	Individual	CH	Teachers	Preschool	Joint attention techniques
Campbell (1986)	69	61	Individual	GD	Undergraduate students	College classroom	Spanish
Caux (1995)	12	11	Group	AL	Undergraduate students	College classroom	French
Clerici-Arias et al. (2003)	42	42	Individual	JIT	Undergraduate students	College classroom	Economics

Table 1, continued.

Study	Sample Size <sup>a</sup>		Unit of Randomization	Adult Learning Method <sup>c</sup>	Learner Description	Setting	Learner Outcome
	E	C					
Craven (1990) Study 1 Craven (1990) Study 2	9 5	4 <sup>b</sup>	Group	CH	Teachers	Junior high school	Effective instructional practices
Dipamo & Job (1991)	12	12	Group	AL	Undergraduate students	College classroom	Rare vocabulary
Eastman (1993)	41	40	Individual	AL	Accountants	Industry training class	Tax reporting
Gattellari et al. (2005)	135	140	Individual	CH	Physicians	Medical office	PSA screening practices
Goker (2006)	16	16	Individual	CH	Teachers	Not reported	Instructional practice
Goldberg & Shuman (1984a)	53	80	Group	GD	Undergraduate students	College classroom	Physical science
Goldberg & Shuman (1984b)	57	41	Group	GD	Undergraduate students	College classroom	Physical science
Goldsmith et al. (2000)	98	97	Individual	JIT	Patients	Hospital	Pain management
Hancock et al. (1981)	321	228	Group	GD	Undergraduate students	College classroom	Production management
Hepner (1989)	21	20	Individual	GD	Undergraduate students	College classroom	Nursing
Hoggard (1980)	30	30	Individual	GD	Undergraduate students	College classroom	Chemistry
Hosack-Curlin (1988)	12	12	Individual	CH	Teachers	Elementary school	Writing process instruction
Hursh et al. (1980)	26	24	Group	GD	Undergraduate students	College classroom	Engineering
Landers (1975)	27	15	Group	GD	Undergraduate students	College classroom	Engineering
McGinty (1988)	16	19	Group	AL	Undergraduate students	College classroom	Administrative policy business



Table 1, continued.

Study	Sample Size		Unit of Randomization	Adult Learning Method	Learner Description	Setting	Learner Outcome
	E	C					
Miller et al. (2004) Study 1 Miller et al. (2004) Study 2 Miller et al. (2004) Study 3	33 34 26	} 23 <sup>b</sup>	Individual	CH	Counselors	Human services and health office	Motivational interviewing technique
Moreno-Montalvo (1987)	31	28	Individual	AL	ESL students	College classroom	English as a Second Language
Newsome & Tillman (1990)	25	25	Individual	GD	Undergraduate students	College classroom	Nursing
Peterson (1995)	24	18	Group	AL	Managers	Cost management workshop	Cost management
Pierce & Miller (1994)	14	15	Group	CH	Pre-service teachers	Special education classroom	Teaching practices
Portes et al. (1992)	81	74	Group	AL	Undergraduate students	College classroom	Education psychology & mathematics
Prichard (1990)	28	21	Group	AL	Undergraduate students	College classroom	Math
Robinett (1976) Study 1 Robinett (1976) Study 2	66 14	} 18 <sup>b</sup>	Group	AL	Undergraduate students	College classroom	Spanish
Schiffler (1986) Study 1	18	18	Individual	AL	Undergraduate students	College classroom	French
Schiffler (1986) Study 2	11	11	Individual	AL	Undergraduate students	College classroom	French
Schuster (1976)	19	32	Group	AL	Undergraduate students	College classroom	Spanish
Shaw (1980)	21	NR	Group	GD	Undergraduate students	College classroom	Microcomputers
Showers (1982)	9	8	Individual	CH	Teachers	Junior high school	Teaching models
Simkins & Maier (2004)	18	19	Individual	JIT	Undergraduate students	College classroom	Macroeconomics
Slunt & Giancarlo (2004)	66	185	Group	JIT	Undergraduate students	College classroom	Organic chemistry

Table 1, continued.

Study	Sample Size		Unit of Randomization	Adult Learning Method	Learner Description	Setting	Learner Outcome
	E	C					
Snyder (1980)	33	20	Group	GD	Undergraduate students	College classroom	Medical surgical procedures
Stahl et al. (1991) Study 1 Stahl et al. (1991) Study 2	20 20	} 20 <sup>b</sup>	Group	AL	Undergraduate students	College classroom	Rare vocabulary
Stein et al. (1982)	18	24	Group	AL	Graduate students	College classroom	Rare vocabulary
Wynn (1987)	11	11	Individual	CH	Pre-service teachers	Elementary school	Teaching methods
Zeiss (1984)	7	7	Group	AL	ESL students	College classroom	English as a Second Language

<sup>a</sup> E = Experimental group and C = Control group.

<sup>b</sup> Indicates that the participants were assigned to two or more experimental groups and one control group.

<sup>c</sup> AL = Accelerated learning, CH = Coaching, GD = Guided design, and JIT = Just-in-time training.

**Table 2**  
**Adult Learning Method Practice Characteristics**

Study	Length of Training (Hrs)	Planning		Application		Understanding	
		Introduce	Illustrate	Practice	Evaluate	Reflection	Mastery
Anderson & Render (1987)	< 1	Dramatic reading	NR <sup>a</sup>	NR	NR	NR	NR
Baker (1983)	26	Lecture	Role play	Real life	Discussion of strengths and weaknesses	Performance improvement	NR
Bartley (1997)	48	Quizzes to probe knowledge prior to lecture	NR	NR	NR	NR	NR
Bass (1985)	11	Imagery and dramatic reading	NR	Learner participation in word games or creative writing	Learners check their own quiz answers	NR	NR
Benedict & Anderton (2004)	48	Quizzes to probe knowledge prior to lecture	Answers from quizzes incorporated into class lectures	NR	NR	NR	NR
Bing-You et al. (1998)	2	Lecture	Instructional video	Role play and real life	NR	NR	Skills based assessment
Bodine (1978)	8	Lecture	NR	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor
Bowman & McCormick (2000)	21	Lecture	Role play	Role play and real life	NR	Performance improvement	Skills based assessment
Bradner (1996)	64	Dramatic reading and peripherals	Real life	Skits, plays and role play	NR	NR	NR
Bullard (1986)	16	Learner self-instruction	NR	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor

Table 2, continued.

Study	Length of Training (Hrs)	Planning		Application		Understanding	
		Introduce	Illustrate	Practice	Evaluate	Reflection	Mastery
Cain et al. (2007)	7	Lecture	Role play	Real life	NR	NR	Skills based assessment
Campbell (1986)	48	Learner self-instruction	NR	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor
Caux (1995)	80	Peripherals	NR	NR	NR	NR	NR
Clerici-Arias et al. (2003)	50	Activity to complete and submit prior to lecture	Answers from quizzes incorporated into class lectures	Learner participation in guided discussion or activities based on responses to pre-class assignments	Discussions of strengths and weaknesses	NR	NR
Craven (1990) Study 1	16	Lecture	Instructional video	Real Life	Discussions of strengths and weaknesses	NR	NR
Craven (1990) Study 2	11	Lecture	Instructional video	Real life	NR	NR	NR
Dipamo & Job (1990, 1991)	< 1	Imagery	Real life	Learner participation in word games or creative writing	NR	NR	NR
Eastman (1993)	8	Imagery	NR	NR	NR	NR	NR
Gattellari et al. (2005)	3	Lecture	NR	Real life	NR	NR	Skills based assessment
Goker (2006)	21	Lecture	Role play	Real life	Discussion of strengths and weakness	NR	NR
Goldberg & Shuman (1984a)	96	Lecture	Simulation	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor

Table 2, continued.

Study	Length of Training (Hrs)	Planning		Application		Understanding	
		Introduce	Illustrate	Practice	Evaluate	Reflection	Mastery
Goldberg & Shuman (1984b)	13	Lecture	Simulation	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor
Goldsmith et al. (2000)	1	Information given to patient by nurse	NR	Access information on website	NR	NR	NR
Hancock (1981, 1983)	48	Learner self-instruction	NR	Realistic problem solving situations	Review solution that group or individual provided	Group reflection on feedback	Group assesses feedback received from instructor
Hepner (1989)	12	Lecture	NR	Realistic problem solving situations	Review solution that group or individual provided	Group reflection on feedback	Group assesses feedback received from instructor
Hoggard (1980)	48	Lecture	NR	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor
Hosack-Curlin (1988)	38	Lecture	Role play and real life	Role play and real life	Discussion of strengths and weakness	Journal writing	NR
Hursh et al. (1980)	48	Learner self-instruction	NR	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor
Landers (1975)	30	Lecture	NR	Realistic problem solving situations	Review solution that group or individual provided	Group reflection on feedback	Group assesses feedback received from instructor
McGinty (1988)	36	Dramatic reading	NR	Skits, plays and role play	NR	Journal writing	NR
Miller et al. (2004) Study 1	13	Lecture	Role play	Role play	NR	NR	Standards based assessment

Table 2, continued.

Study	Length of Training (Hrs)	Planning		Application		Understanding	
		Introduce	Illustrate	Practice	Evaluate	Reflection	Mastery
Miller et al. (2004) Study 2	18	Lecture	Role play	Role play and real life	NR	Behavior suggestions	Skills based assessment
Miller et al. (2004) Study 3	19	Lecture	Role play	Role play and real life	NR	Behavior suggestions	Standards based assessment
Moreno-Montalvo (1987)	39	Imagery, dramatic reading and peripherals	NR	Skits, plays and role play	NR	NR	NR
Newsome & Tillman (1990)	9	Learner self-instruction	NR	Realistic problem solving situations	Review solution that group or individual provided	Group reflection on feedback	Group assesses feedback received from instructor
Peterson (1996)	NR	Imagery, dramatic reading and peripherals	NR	Skits, plays and role play	NR	NR	NR
Pierce & Miller (1994)	65	Lecture	NR	Real life	NR	Performance improvement	Skills based assessment
Portes et al. (1992)	3	Imagery	NR	NR	NR	NR	NR
Prichard (1990)	68	Dramatic reading	NR	NR	NR	NR	NR
Robinet (1975)	25	Dramatic reading	NR	NR	NR	NR	NR
Schiffler (1986) Study 1	56	Dramatic reading	Role play	Role play	NR	NR	NR
Schiffler (1986) Study 2	56	Dramatic reading	Role play	Role play	NR	NR	NR
Schuster (1976)	32	Dramatic reading	Role play	Role play	NR	NR	NR
Shaw (1980)	48	Learner self-instruction	Simulation	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor
Showers (1982)	26	Lecture	Role play	Real life	Discussion of strengths and weaknesses	Performance improvement	NR

Table 2, continued.

Study	Length of Training (Hrs)	Planning		Application		Understanding	
		Introduce	Illustrate	Practice	Evaluate	Reflection	Mastery
Simkins & Maier (2004)	48	Activity to complete and submit prior to lecture	Answers from quizzes incorporated into class lectures	NR	NR	NR	NR
Slunt & Giancarlo (2004)	48	Warm up exercise completed less than 12 hours prior to class	Answers from quizzes incorporated into class lectures	Learner participation in guided discussion or activities based on responses to pre-class assignment	NR	NR	NR
Snyder (1980)	48	Learner self-instruction	NR	Realistic problem solving situations	Review solution that group or individual provided and make corrections to proposed solution	Group reflection on feedback	Group assesses feedback received from instructor
Stahl et al. (1991) Study 1	18	Imagery	NR	NR	NR	NR	NR
Stahl et al. (1991) Study 2	18	Dramatic reading	NR	NR	Learners check their own quiz answers	NR	NR
Stein et al. (1982)	< 1	Dramatic reading	NR	NR	NR	NR	NR
Wynn (1986)	30	Lecture	Instructional video	Real life	Discussion of strengths and weaknesses	Journal writing	NR
Zeiss (1984)	13	Dramatic reading	NR	NR	NR	NR	NR

<sup>a</sup>NR = Not reported or described as a characteristic of the adult learning method.

**Table 3**  
**Major Findings from the Studies of the Four Adult Learning Methods**

Study	Adult Learning Method <sup>a</sup>	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size	
Anderson & Render (1987) Study 1	AL	Knowledge	Word to definition	Language posttest exam	-1.14	
Anderson & Render (1987) Study 2	AL	Knowledge	Word to definition	Language posttest exam	-1.29	
Anderson & Render (1987) Study 3	AL	Knowledge	Word to definition	Language posttest exam	-1.04	
Anderson & Render (1987) Study 4	AL	Knowledge	Word to definition	Language posttest exam	-1.07	
Baker (1983)	CH	Skills	Observational rating scale	Transfer of Training: Skills	1.77	
				Transfer of Training: Appropriateness	1.64	
				Transfer of Training: Comfort/familiarity	1.49	
				Transfer of Training: Practice/frequency of use	1.18	
		Skills		Teacher Innovator System (Weil, Gullion, & Cole, 1971)	Structuring skills	.86
					Information processing skills	1.05
					Feedback skills	.41
					Factual Information Processing	.41
					Conceptual Information Processing	1.07
					Theoretical Information Processing	.78
Bartley (1997)	JIT	Knowledge	Course content	Teacher constructed knowledge test	1.15	
Bass (1985) Study 1	AL	Attitude	Listed Thought Procedure (Bass, 1985)	LPT attitude scores	.24	
		Knowledge	Word to definition	Language vocabulary exam	.45	
Bass (1985) Study 2	AL	Attitude	Listed Thought Procedure (Bass, 1985)	LPT attitude scores	.15	
		Knowledge	Word to definition	Language vocabulary exam	.44	



Table 3, continued.

Study	Adult Learning Method	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size
Benedict & Anderton (2004)	JIT	Knowledge	Course content	Final exam	.38
Bing-You et al. (1998)	CH	Self-efficacy	Survey	How I am progressing	.38
				Enough information to improve my performance	.11
				How I compare to my peers	-.09
				Enough information to know I am a competent student	.54
				Effective in soliciting the feedback I need	-.13
				How to develop personal learning goals	.24
Bodine (1978)	GD	Attitude	Survey	Study attitudes toward college courses	.39
		Knowledge	Course content	Content knowledge exam	-.12
Bowman & McCormick (2000)	CH	Skills	Clarity Observation Instrument (Metcalf, 1989)	Frequency of clarity skills	1.78
				Quality of use of clarity skills	2.57
				Overall demonstration of clarity skills	2.36
		Knowledge	Observation	Knowledge of education theory	5.84
		Attitude	Rating Scale	Technical feedback	.79
				Analysis of application	1.12
				Adaptation to students	.86
				Personal facilitation	.85
Bradner (1996)	AL	Knowledge	Course content	Test of job requirements	.77
			Observation rating	Customer service test	.44
		Skills	Course content	Computer usage exam	.47
Bullard (1986)	GD	Knowledge	Course content	Content laboratory knowledge exam	1.16

Table 3, continued.

Study	Adult Learning Method	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size
Cain et al (2007)	CH	Skills	Joint Attention Observation Coding System (Cain et al., 2007)	Joint attention engagement bids	1.49
				Verbal events	-.82
				Focus-Follow-Talk™ statements	-1.50
				Joint attention support statements	-.92
				Questions	.19
				Teacher-directed statements	1.90
Campbell (1986)	GD	Knowledge	Modern Language Cooperation (Campbell, 1986)	Reading test	.13
				Writing test	.51
				Course content	Content knowledge exam
Caux (1995)	AL	Knowledge	Oral Proficiency Interview (Byrnes, Buck, & Thompson, 1989)	Oral language interview	.93
Clerici-Arias et al. (2003)	JIT	Knowledge	Course content	Exam score comparisons	.22
Craven (1990) Study 1	CH	Skills	COKER (Modified) (Coker & Coker, 1982a, 1982b)	Students initiate verbal interaction	.60
				Teacher amplifies and discusses student response	1.43
				Students are involved	1.77
				Prepares and/or uses various methods and techniques to present subject matter and encourages student participation	-.65
				Promotes positive self-image in students	2.06

Table 3, continued.

Study	Adult Learning Method	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size
Craven (1990) Study 1	CH	Skills	COKER (Modified) (Coker & Coker, 1982a, 1982b)	Is consistent and empathetic in the treatment of students	.34
				Practices good human relations	-.58
				Exhibits overall positive approach	-.03
				Stimulates group discussion and individual participation	.07
				Nurtures creativity and discovery	.90
				Helps learners develop positive attitude toward self, encourages confidence and self-respect	.97
				Seeks, accepts and uses student ideas as part of teaching procedures	1.77
				Motivates students to ask questions	-.13
				Uses questions that lead students to analyze, synthesize and think critically	.09
				Accepts varied student viewpoints and / or asks students to extend or elaborate answers or ideas	.68
				Demonstrates proper listening skills	.84
				Provides feedback to learners on their cognitive performance	1.60
Uses positive reinforcement patterns with students	.58				
Craven (1990) Study 2	CH	Skills	COKER (Modified) (Coker & Coker, 1982a, 1982b)	Students initiate verbal interaction	.05
				Teacher amplifies and discusses student response	-.20
				Students are involved	-.13
				Prepares and/or uses various methods and techniques to present subject matter and encourages student participation	-.26
Craven (1990) Study 2	CH	Skills	COKER (Modified) (Coker & Coker, 1982a, 1982b)	Promotes positive self-image in students	-.71

Table 3, continued.

Study	Adult Learning Method	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size	
Craven (1990) Study 2, continued				Is consistent and empathetic in the treatment of students	-1.15	
				Practices good human relations	-1.22	
				Exhibits overall positive approach	-.18	
				Stimulates group discussion and individual participation	-.58	
				Nurtures creativity and discovery	-.71	
				Helps learners develop positive attitude toward self, encourages confidence and self-respect	2.09	
				Seeks, accepts and uses student ideas as part of teaching procedures	-.50	
				Motivates students to ask questions	-.48	
				Uses questions that lead students to analyze, synthesize and think critically	-.48	
				Accepts varied student viewpoints and / or asks students to extend or elaborate answers or ideas	-.37	
				Demonstrates proper listening skills	.63	
				Provides feedback to learners on their cognitive performance	.10	
				Uses positive reinforcement patterns with students	.58	
Dipamo & Job (1990, 1991)	AL	Knowledge	Paired associate nouns test	Word acquisition and retention test	-.64	
Eastman (1993)	AL	Knowledge	Course content	Posttest scores (multiple-choice items)	.15	
				Hypothetical situation (provided missing information)	Transfer task scores	.29
			Attitude	Rating scale	Evaluation of course content	.58
					Overall attitude toward class	.48
		Survey		Overall rating of class	.52	
				Personal teaching efficacy	.54	
				Outcome Efficacy	.61	
				Questionnaire on evidence base for PSA screening	1.33	
	CH	Knowledge				

Table 3, continued.

Study	Adult Learning Method	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size
Gattellari et al. (2005)			Survey	Questionnaire on steps to help patients make informed decisions	1.04
				Rating of confidence in promoting informed decision making	1.20
				Level of confidence in conflict situations	.42
	CH	Skills	Clarity Observation Instrument (Metcalf, 1989)	Clarity of instructional skills	5.84
Goker (2006)		Attitude	Rating Scale	Satisfaction with coaching	2.58
		GD	Self-efficacy	Survey	Perceptions of decision making ability
Goldberg & Shuman (1984a)	GD	Knowledge	Rating Scale	Knowledge of causes and solutions to energy problem	.05
Goldberg & Shuman (1984b)		Self Efficacy	Rating Scale	Satisfaction with coaching	-.04
		JIT	Skills	Rating Scale	Level of pain
Goldsmith et al. (2000)	GD	Knowledge	Course content	Content knowledge exam	.56
Hancock (1981, 1983)	GD	Knowledge	Course content	Content knowledge exam	.56
Hepner (1989)	GD	Knowledge	Course content	Content recall exam	-.05
		Skills	Course content	Nursing plans exam	2.34
				Application test exam	.85
Hoggard (1980)	GD	Attitude	Frequency count	Dropout rate	1.42
Hosack-Curlin (1988)	CH	Skills	Observational rating scale	Teacher implementation of writing skills process	.37
			Levels of Use (Loucks, Newlove, & Hall, 1975)	Interview/writing process	1.11
Hursh et al. (1980)	GD	Knowledge	Course content	Course performance exam	2.98
		Attitude	Survey	Student attitudes towards course experience	.74
				Student attitudes towards course process	.35

Table 3, continued.

Study	Adult Learning Method	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size	
Landers (1975)	GD	Knowledge	Course content	Student attitudes towards course experience	.35	
			Skills	Application	Performance projects	-.01
McGinty (1988)	AL	Knowledge	Cumulative class points	Participation, mid-term, and final exam	1.04	
			Overall class grade	Numerical course grade	.38	
Miller et al. (2004) Study 1	CH	Skills	Motivational Interviewing Skill Code (Miller & Mount, 2001)	Numerical course grade	.78	
				Overall MI Spirit	.83	
Miller et al. (2004) Study 2	CH	Skills		Percent MI consistent behaviors	.68	
				Overall MI Spirit	.59	
Miller et al. (2004) Study 3	CH	Skills		Percent MI consistent behaviors	1.12	
				Overall MI Spirit	.91	
Moreno-Montalvo (1987)	AL	Knowledge	Oral Interview	Language post-interview exam scores	.71	
			Observation	Language skit presentation scores	1.37	
			Course content	Course post test scores	.36	
Newsome & Tillman (1990)	GD	Knowledge	Course content	Content knowledge exam	.32	
			Skills	Application	Accuracy of care plans	1.89
					Simulated preparing a care plan	1.25
Peterson (1996)	AL	Knowledge	Course content	Application of concepts	-.99	
				Knowledge of cost management principles	-1.10	
				Comprehension of concepts	-.01	
	Attitude	Rating scale	Attitude about the learning method	-.04		
Pierce & Miller (1994)	CH	Skills	Observational measure	Effective teaching behaviors	.03	
Portes et al. (1992)	AL	Knowledge	Course content	Course final exam	-.02	
	AL	Attitude	State-Trait Anxiety Inventory (Spielberger, Gorusch, & Luschene, 1970)	Trait anxiety	-.35	

Table 3, continued.

Study	Adult Learning Method	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size
Prichard (1990)	AL	Knowledge	Course content	Course final exam (multiple-choice items test)	.66
Robinett (1976) Study 1	AL	Knowledge	Foreign language achievement	Course posttest exam scores	.64
		Attitude	Frequency count	Class absences	.63
Robinette (1976) Study 2	AL	Knowledge	Foreign language achievement	Course posttest exam scores	.85
		Attitude	Frequency count	Class absences	-.18
Schiffler (1986) Study 1	AL	Knowledge	Language exam	Language vocabulary score at 7 <sup>th</sup> yr	.20
				Language structure score at 7 <sup>th</sup> yr	.00
				Language vocabulary score at 8 <sup>th</sup> yr	.00
				Language structure score at 8 <sup>th</sup> yr	.08
			Language C-Test (Schiffler, 1986)	Language proficiency	.93
				Language Translation from new language	.97
				Language Translation from new language	.55
				Language Oral communication	.07
Schiffler (1986) Study 2	AL	Knowledge	Language exam	Language vocabulary score at 8 <sup>th</sup> yr	.00
				Language Structure score at 8 <sup>th</sup> yr	.20
				Language Vocabulary score at 9 <sup>th</sup> yr	.63
				Language Structure score at 9 <sup>th</sup> yr	.61
			Language C-Test (Schiffler, 1986)	Language proficiency	.71
				Language translation from new language	.18
				Language translation into new language	.49
				Language oral communication	1.79
Schuster (1976)	AL	Knowledge	Course content exam	Oral language final exam scores	.12
			Course content exam	Written language final exam scores	-.58

Table 3, continued.

Study	Adult Learning Method	Outcome Construct	Type of Measure <sup>b</sup>	Outcome Measures	Cohen's <i>d</i> Effect Size
Shaw (1980)	GD	Attitude	Frequency count	Course drop-out rate	1.07
Showers (1982)	CH	Skills	Observational rating scale	Transfer of training overall	1.40
Simkins & Maier (2004)	JIT	Knowledge	Course content	Exam scores	1.27
Slunt & Giancarlo (2004)	JIT	Knowledge	Frequency count	Student taking chemistry pre-class quizzes	.64
Snyder (1980)	GD	Knowledge	Frequency count	Course "A" Grades	.72
Stahl et al. (1991) Study 1	AL	Knowledge	Basic Word Vocabulary Test (Stahl et al., 1991)	Language immediate learning scores	-.04
				Language delayed recall scores	.03
				Language delayed recall scores	.14
Stahl et al. (1991) Study 2	AL	Knowledge	Basic Word Vocabulary Test (Stahl et al., 1991)	Language immediate learning scores	.11
Stein et al. (1982)	AL	Knowledge	Vocabulary word to definition	Language immediate vocabulary retention exam	.47
				Language 1 week delayed retention exam	1.17
Wynn (1987)	CH	Skills	Observational rating scale (Purdom, 1984)	Purdom-Wynn Observation Instrument (PWOI): Introduction	1.17
				PWOI: Content presentation	2.08
				PWOI: Follow up/Feedback	.96
				PWOI: management of student conduct	.44
Zeiss (1984)	AL	Knowledge	Test of English as a Foreign Language (Educational Testing Service, 2008)	Language abilities at 3 wks	1.46

<sup>a</sup>AL = Accelerated learning, CH = Coaching, GD = Guided design, and JIT = Just-in-time training.

<sup>b</sup>Outcome measures that include citations for the adult learning study indicate that the measure is included in the research report.



**Table 4**  
**Effect Sizes for the Relationship Between the Adult Learning**  
**Method Characteristics and the Four Types of Study Outcomes**

Characteristics	Number		Mean Effect Size	95% Confidence Interval	Z
	Studies	Effect Sizes			
<i>Introduction</i>					
Skills	23	23	.69	.56 - .82	10.16*
Self-Efficacy	4	4	.49	.32 - .65	5.71*
Attitudes	15	15	.41	.27 - .54	5.73*
Knowledge	40	40	.33	.26 - .40	8.90*
<i>Illustration</i>					
Attitudes	5	5	1.11	.77 - 1.46	6.42*
Skills	16	16	.74	.56 - .92	7.96*
Knowledge	11	11	.39	.24 - .54	5.17*
Self-Efficacy	3	3	.21	- .02 - .44	1.80
<i>Practicing</i>					
Skills	22	22	.69	.55- .82	9.96*
Attitudes	11	11	.64	.46 - .82	7.00*
Knowledge	24	24	.49	.40 - .58	10.92*
Self-Efficacy	4	4	.49	.32 - .65	5.71*
<i>Evaluation</i>					
Skills	9	9	1.16	.88 - 1.45	7.99*
Attitudes	8	8	.71	.51 - .90	7.08*
Knowledge	14	14	.40	.29 - .51	7.21*
Self-Efficacy	2	2	.22	- .04 - .49	— <sup>a</sup>
<i>Reflection</i>					
Skills	11	11	.95	.72 - 1.17	8.40*
Attitudes	5	5	.75	.53 - .97	6.76*
Knowledge	12	12	.46	.34 - .58	7.75*
Self-Efficacy	2	2	.22	- .04 - .49	— <sup>a</sup>
<i>Mastery</i>					
Skills	9	9	.78	.57 - .99	7.33*
Attitudes	5	5	.75	.53 - .97	6.76*
Knowledge	12	12	.58	.47 - .69	10.60*
Self-Efficacy	4	4	.49	.32 - .65	5.71*

<sup>a</sup> Too few effect sizes were available for analysis.

\* $p < .0001$ .

**Table 5**  
**Moderators of the Relationships Between the Adult Learning**  
**Method Characteristics and the Study Outcomes**

Moderators	Number		Mean Effect Size	95% Confidence Interval	Z
	Studies	Effect Sizes			
<i>Type of Study</i>					
Published	32	41	.39	.32 - .46	11.43**
Unpublished	26	41	.47	.38 - .56	9.81**
<i>Unit of Randomization</i>					
Individual	26	38	.70	.62 - .79	16.10**
Group	32	44	.22	.15 - .29	6.15**
<i>Year of Publication</i>					
1975-1989	31	44	.31	.24 - .39	8.09**
1990-1999	15	22	.21	.09 - .33	3.52*
2000-2007	12	16	.79	.68 - .90	14.62**
<i>Learners</i>					
Practitioners	21	31	.70	.60 - .80	14.16*
College Students	37	51	.29	.22 - .35	8.51**
<i>Setting</i>					
Work Environment	11	16	.64	.53 - .74	11.82**
University Classroom	46	64	.32	.25 - .38	9.77**
<i>Number of Participants</i>					
Small (9 to 34)	15	22	.91	.71 - 1.11	8.93**
Medium (35 to 75)	25	36	.48	.38 - .58	9.48**
Large (76 to 300+)	18	24	.33	.26 - .40	9.32**
<i>Length of Training</i>					
1 to 10 Hours	16	23	.21	.13 - .30	4.91*
11 to 40 Hours	23	35	.55	.44 - .67	9.49**
40+ Hours	18	22	.60	.51 - .70	12.78**

\* $p < .001$ . \*\* $p < .0001$ .