1. Getting to know each other
   a. Name Exercise
   b. Life Stories

2. Assessment/Placement results as of 6/5/13

3. Video clips
   Baby Squirrel: http://www.youtube.com/watch?v=1jByfWOLmjo
   Every kid needs a champion: http://www.youtube.com/watch?v=SFnMTHhKdkw

4. The Random Thoughts of Louis Schmier

5. Toolkit –
   a. Student Engagement Techniques – by Elizabeth F. Barkley
   b. An Overview of Cooperative Learning – by David W. Johnson and Roger T. Johnson
   c. Desktop Cooperative Learning Strategies Companion
   d. Development and Use of the ARCS Model of Instructional Design – by John M. Keller
   e. How to Integrate Learner Motivation Planning into Lesson Planning: The ARCS Model Approach – by John M. Keller
   f. Collaborative Learning and the “Conversation of Mankind” – by Kenneth A. Bruffee
   g. Reforming Mathematics Classroom Pedagogy: Evidence-Based Findings and Recommendations for the Developmental math Classroom – by Michelle Hodara

6. Summer Program Schedules, 7/8 to 8/8 (or 8/9)
   Week 1: Extended Orientation (tentative student schedule grid)
   Weeks 2 to 5: Bridge Classes
      Academic Prep 5
      Basic Skills 2
      Basic Skills 35
   8/9: possible picnic to end the summer program

7. Service Learning?

8. Classroom Supplies
Chris Page 714-470-5476
Stephanie Burnus 562-253-5178
Terence Patterson 323-480-6981
Frida Valderrama 909-724-9217
Laura Picklesimer (949)468-9586
Dear Conference Delegates,

On behalf of the staff of the National Resource Center for The First-Year Experience and Students in Transition at the University of South Carolina, I am happy to welcome you to Atlanta, Georgia as we celebrate 20 years of the National Conference on Students in Transition. As we honor this milestone, we are pleased to have Bainbridge State College, Georgia Institute of Technology, Kennesaw State University, and Spelman College as cohosts of this event. Representing a diversity of institutional size, purpose, and control, our cohosts remind us how rewarding collaboration across higher education can be. I know that I speak for all of us when I extend warm conference greetings to you.

The staff of the National Resource Center has planned an outstanding program of preconference workshops, featured speakers, and conference sessions that cover a broad range of topics and offer opportunities for learning and professional development for everyone. This conference includes sessions dedicated to the education and support of first-year students, sophomores, community college students, transfers, and seniors. Further, the program contains a full complement of presentations highlighting the latest research findings, assessment strategies, as well as trends and issues that are relevant to students’ success at multiple transition points in their educational careers. We are confident that you will find the information and resources that are shared in these sessions useful to your current work and a source of inspiration for new ideas and initiatives in support of students’ transition and success.

While learning from educational sessions is valuable to our work, the conference schedule is also designed to facilitate informal interactions among participants. We take great pride in hosting professional development events that create a community among delegates, presenters, exhibitors, and hosts and strive to develop a rich professional network that extends long beyond our time together at the conference. To that end, the schedule includes several networking opportunities to complement and enhance your more formal learning experiences and to facilitate your introduction to new colleagues and friends. Given the challenges that higher education is currently facing, it has never been more important to learn from and support one another than it is now. As such, we encourage you to take advantage of these opportunities to discuss ideas about new programs, pedagogies, and practices for students in transition with your fellow delegates.

Representatives from the National Resource Center and from our cohost institutions are here to help you in any way that we can. Please do not hesitate to contact us at the conference registration desk if you have questions or concerns. Those of us on the conference planning staff look forward to meeting you, working with you, and learning from you during our time in Atlanta and in the future. Enjoy the conference!

Sincerely,

Jennifer R. Keup

Director, National Resource Center for The First-Year Experience & Students in Transition
TABLE OF CONTENTS

GENERAL INFORMATION
Welcome .................................................................................................................. 2
Goals of the Conference .................................................................................... 2
Core Commitments ........................................................................................... 2
Conference Sponsor / Co-hosts .......................................................................... 3
Registration Information .................................................................................... 3
Hotel Map ............................................................................................................ 3
Learning Objectives .......................................................................................... 4
Message Board ................................................................................................... 5
No-Smoking Policy ............................................................................................. 5
Cell Phone Usage ............................................................................................... 5
Internet Access ................................................................................................. 5
Parking ................................................................................................................ 5
Nametag Ribbons ............................................................................................... 5
Session Evaluations ......................................................................................... 5
Conference Evaluation .................................................................................... 5
Session Handouts ............................................................................................. 5
Continuing Education Units ........................................................................... 5
Session Formats ............................................................................................... 6
Staff Roster ......................................................................................................... 6
National Advisory Board .................................................................................. 6
Proposal Reviewers .......................................................................................... 7
Paul P. Fidler Research Grant Reviewers .......................................................... 7
Exhibitor Information ....................................................................................... 8
Saturday, October 19, 2013
Preconference Workshop and Conference Registration .............................. 10
Preconference Workshops ............................................................................... 10
Conference Opening Session and Keynote Address ...................................... 10
Opening Reception ........................................................................................... 10
Sunday, October 20, 2013
Conference Registration .................................................................................. 12
Continental Breakfast ...................................................................................... 12
Primer for First-Time Attendees ..................................................................... 12
Conference Sessions ....................................................................................... 12-16
Afternoon Plenary Address ............................................................................. 16
2013-2014 Paul P. Fidler Grant Recipient ......................................................... 22
Conference Sessions ....................................................................................... 22-28
Monday, October 21, 2013
Conference Registration .................................................................................. 24
Colleague Cluster Breakfast with Poster Sessions ........................................ 24
Conference Sessions ....................................................................................... 24-30
Closing Town Meeting ..................................................................................... 29
Index of Presenters .......................................................................................... 34-35
Continuing Education Units Form ................................................................. 36-37
Notes .................................................................................................................. 38-40

SCHEDULE OF EVENTS

SATURDAY | OCTOBER 19, 2013
7:30 am – 6:00 pm  Preconference Workshop and Conference Registration
7:30 am – 9:00 am  Continental Breakfast
7:30 am – 9:30 am  Continental Breakfast for Preconference Workshop Participants
8:00 am – 5:00 pm  Preconference Workshops
12:00 noon – 1:30 pm  Lunch for Preconference Workshop Participants Only
5:30 pm – 7:00 pm  Conference Opening Session and Keynote Address—M. Stuart Hunter
7:00 pm - 7:45 pm  Opening Reception

SUNDAY | OCTOBER 20, 2013
7:30 am – 5:00 pm  Conference Registration and Information Desk
7:30 am – 9:00 am  Continental Breakfast
7:45 am – 8:45 am  Primer for First-Time Attendees
9:00 am – 11:15 am  Conference Sessions
11:15 am – 12:15 pm  Lunch on your own
12:30 pm – 1:45 pm  Afternoon Plenary Address — Marilee J. Bresicani
2:00 pm – 5:30 pm  Conference Sessions

MONDAY | OCTOBER 21, 2013
7:30 am – 9:30 am  Colleague Cluster Breakfast with Poster Sessions
7:30 am – 12:00 noon  Conference Registration and Information Desk
9:45 am – 12:00 noon  Conference Sessions
12:15 pm – 12:45 pm  Closing Town Meeting
CORE COMMITMENTS

**Student Transitions:** Student transitions, such as the first year of college, sophomore year, transfer experience, degree completion, and new graduate student experiences, are critical junctures in the educational pipeline and unique opportunities for post-secondary student learning and development. We strive to set a standard of excellence for supporting student transitions and facilitating educational success for a diversity of students in the 21st century.

**Connection Between Research and Practice:** We believe that good practice in higher education must rely upon a foundation of high-quality research. Conversely, good research draws from and informs practices in our field. As such, the work of the National Resource Center advances and supports both scholarly practice and applied research.

**Inclusion:** We strive to create a supportive and professional environment where a diversity of viewpoints are recognized and considered in the ongoing dialogue on student transitions. One of the greatest strengths of the first-year experience and students in transition movement is its ability to cut across traditional boundaries in higher education and involve professionals from multiple sectors of education, institutional roles, and disciplinary perspectives as well as from a variety of personal backgrounds, institutional environments, and educational experiences.

**Collaboration:** Partnership and collaboration draw from the interdisciplinary nature of higher education, communicate an ongoing commitment to inclusion, and, ultimately, enhance the success of our efforts to support student transitions. The National Resource Center models effective collaboration and aims to create intentional and integrative connections between colleagues, units, organizations, systems, educational sectors, regions, and countries in support of student transition and success.

**Lifelong Learning:** We believe that all educators continue to be lifelong learners. We support a climate of intellectual curiosity and provide the tools and media to pursue professional development and an ongoing process of inquiry, exploration, and discovery.

---

**Welcome to the**

**Students in Transition**

**Celebrating 20 Years**

This conference is designed with a setting and structure intended to be as professionally enriching as it is individually pleasurable. We hope this will be a rewarding conference for you.

**GOALS OF THE CONFERENCE**

The primary goal of the Students in Transition Conference is to assist highly motivated educators and administrators in institutions of higher education as they examine and develop strategies to change campus structures to enhance the learning and success of students in transition: first-year students, sophomores, transfers, and seniors. The conference format provides the opportunity to network and share concepts, ideas, research results, assessment strategies, and programmatic initiatives; and creates an experience sure to stimulate, motivate, and inspire.

- Providing information on successful and innovative programs that are helping to attract and retain students.
- Encouraging the development of working partnerships/collaborations among academic administrators, student support administrators, and faculty.
- Examining topics related to improving the academic experience.
- Learning about supplemental programs that focus on the development of students in transition as well-adjusted, caring human beings, responsible citizens, and successful students.

---

THE FIRST-YEAR EXPERIENCE® is a service mark of the University of South Carolina. A license may be granted to registered conference attendees and others upon written request to use the term THE FIRST-YEAR EXPERIENCE® in association with educational programmatic approaches to enhance the first year developed as a result of participation in this conference series. This license is not transferable and does not apply to the use of the service mark in any other programs or on any other literature without the written approval of the University of South Carolina.

The University of South Carolina provides equal opportunity and affirmative action in education and employment for all qualified persons regardless of race, color, religion, sex, national origin, age, disability, sexual orientation, or veteran status. The University of South Carolina System has designated as the ADA Title II, Section 504 and Title IX coordinator the Executive Assistant to the President for Equal Opportunity Programs. The Office of the Executive Assistant to the President is located 1800 Hampton Street Annex, Columbia, South Carolina, Telephone (888) 777-3854.
CONFERENCE SPONSOR AND CO-HOSTS

National Resource Center for The First-Year Experience and Students in Transition

Building upon its history of excellence as the founder and leader of the first-year experience movement, the National Resource Center for The First-Year Experience and Students in Transition serves education professionals by supporting and advancing efforts to improve student learning and transitions into and through higher education. The Center achieves this mission by providing opportunities for the exchange of practical and scholarly information as well as the discussion of trends and issues in the higher education field through the convening of conferences, institutes, workshops, and online learning opportunities; publishing books, research reports, a peer-reviewed journal, an electronic newsletter, and guides; generating, supporting, and disseminating research and scholarship; hosting visiting scholars; and maintaining several online channels for resource sharing and communication, including a dynamic website, listservs, and social media outlets.

University of South Carolina

Chartered in 1801 as South Carolina College, the University of South Carolina, Columbia remains on its original site in the state capital. The University of South Carolina is a publicly-assisted, coeducational institution dedicated to the entire state of South Carolina. The primary mission of the University of South Carolina, a multi-campus public institution, is the education of the state’s diverse citizens through teaching, research and creative activity, and service. The University is committed to providing its students with the highest-quality education, including the knowledge, skills, and values necessary for success and responsible citizenship in a complex and changing world.

CO-HOSTS

The staff of the National Resource Center for The First-Year Experience and Students in Transition expresses appreciation to our co-hosts for their support and assistance:

Bainbridge State College
Georgia Institute of Technology
Kennesaw State University
Spelman College

REGISTRATION INFORMATION

The Conference Registration/Information Desk will be located in the Grand Ballroom Foyer. The staff of the National Resource Center for The First-Year Experience and Students in Transition will be available to assist you during the following times:

- **Saturday, October 19, 2013**: 7:30 am - 6:00 pm
- **Sunday, October 20, 2013**: 7:30 am – 5:00 pm
- **Monday, October 21, 2013**: 7:30 am - 12:00 noon
Please identify and record up to five goals or learning objectives for your conference experience:

1. _____________________________________________________________________________________________________________
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Other reflections:

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Hotel Map
All conference events will be held at the Westin Buckhead Atlanta. On the inside back cover of this program is a map of the meeting space at the hotel.

Message Board
There will be a message board near the conference registration area. The conference staff asks that you check the board periodically for important general or personal messages.

No-Smoking Policy
The conference organizers request careful observance of the no-smoking policy. We enforce this rule due to the health risks associated with passive exposure to cigarette smoke.

Cell Phone Usage
The conference organizers request that all cell phones are turned to vibrate or off while attending sessions.

Internet Access
Complimentary high-speed internet access is available in guest rooms.

Parking
The hotel offers valet parking for $30 per day and self-parking for $10 per day.

Nametag Ribbons
- Light Blue: Presenters
- Gold: Outstanding First-Year Student Advocates
- Rainbow: Hosting Institutions
- Purple: First-Time Attendees
- Dark Blue: Volunteer

Session Evaluations
Individual Session Evaluation Forms will be distributed and collected in each session by the presenter. Presenters please bring session evaluations to the conference registration desk or drop them in one of the session evaluation collection boxes. Copies of evaluations may be picked up at the end of the conference.

Conference Evaluation
An Overall Conference Evaluation Form will be sent to you via StudentVoice.com after the conference. When you return to your campus, please take a few minutes to complete the evaluation. The information you provide is used to evaluate the conference and improve future conferences; therefore, your comments are extremely important.

Session Handouts
At the conference: There are several tables set up throughout the meeting space for presenters to leave extra handouts from their sessions. Presenters: Be sure to include your name and the title of your presentation on the handout.

After the conference: If you were not able to attend a session of interest, the handouts for the sessions will be available after November 18, 2013. Please note that only those handouts sent to us by presenters will be posted to the website. All presenters are encouraged to submit electronic versions of their session handouts to the National Resource Center by e-mailing them to Lynn Gold at goldlf@mailbox.sc.edu.

Continuing Education Units (CEUs)
In order to meet continuing professional development needs and certification requirements, CEUs are available to preconference workshop and conference attendees. Applicants will receive a Certificate of Participation from the Division of Continuing Education at the University of South Carolina. Preconference workshop attendees will receive CEUs based on the workshop(s) they attend. A CEU form must be completed for each preconference workshop. Applicants for conference CEUs must attend one session during each session time slot and obtain the presenter’s signature on the session attendance form found on pages 36-37 of the program booklet. They must also complete a conference CEU application form. Conference attendees will receive .7 of CEUs. Partial credit cannot be given for attending only some of the sessions or if you fail to obtain presenter signatures.

All CEU forms must be returned to the conference registration table by noon on October 21, 2013. You will need to verify with your institution their acceptance of these credits for continuing professional development needs and certification requirements.
**SESSION FORMATS**

**Concurrent Sessions**
This session includes a formal presentation with time for questions and participant interaction.

**Concurrent session types:**
- **Research (CR)** – These sessions present on quantitative or qualitative research that has been conducted on issues addressing student transitions.
- **Trends & Issues (CT)** – These sessions address emerging trends, current issues, and broad concepts.
- **Institutional Initiative (CI)** – These sessions highlight specific programs/initiatives that have been instituted, assessed, and shown to be successful on a particular campus.

**Roundtable Discussions (R)**
These sessions are designed to promote open discussion around a significant or major issue or theme. Roundtable discussions provide attendees an opportunity to share ideas and learn from one another’s experiences.

**Exhibitor Presentations (E)**
These sessions provide vendors the opportunity to network with conference participants in a formal setting providing information on publications, products, or services. Presentations are scheduled in a 60-minute time slot during the conference.

**Poster Sessions**
Poster sessions are presented in the form of an exhibit and delivered primarily through the use of visual display and handout materials. Numerous poster sessions will be scheduled concurrently, and conference delegates will be free to move from one poster session to another.

**Poster session types:**
- **Research Findings (PR)**
This type of poster session presents research results focused on a specific topic or program.
- **Assessed Programmatic Approaches (PA)**
This type of poster session presents on a specific programmatic approach at a single institution.

**STAFF ROSTER**
National Resource Center for The First-Year Experience® & Students in Transition/University 101

*denotes those attending the conference

- **M. Stuart Hunter**
  Associate Vice President and Executive Director
- **Jennifer Keup**
  Director, National Resource Center for The First-Year Experience & Students in Transition
- **Dan Friedman**
  Director, University 101
- **Rico Reed**
  Assistant Director for Administration & Resource Development
- **Allison Minsk**
  NRC Administration, Marketing, and Resource Development
- **Josh Tyler**
  Graphic Artist
- **Tricia Kennedy**
  Program Coordinator for Peer Leadership
- **Toni Vakos**
  Editor
- **Larry Wood**
  Editor
- **NRC Conferences and Continuing Education**
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    Assistant Director for Conferences & Continuing Education
  - **Lauren Hall**
    Program Coordinator for Continuing Education Initiatives
  - **Jennie Duval**
    Business Associate & Conference Registrar
- **NRC Publications**
  - **Tracy L. Skipper**
    Assistant Director for Publications
  - **Paul A. Gore, Jr.**
    Journal/Editor
- **NRC Research, Grants, and Assessment**
  - **Dallin George Young**
    Assistant Director for Research, Grants, & Assessment
- **University 101 Programs**
  - **Mary Elizabeth Sewell**
    Associate Director, University 101
  - **Kevin Clarke**
    Program Coordinator for Faculty Development and Assessment
- **Department Administration and Technical Support**
  - **Tamila Pringle**
    Budget & Human Resources Manager
  - **Bert Easter**
    Information Resource Consultant
- **Center Fellows**
  - **John N. Gardner, Senior Fellow**
  - **Betsy O. Barefoot**
    Dorothy S. Fidler
- **Graduate Assistants**
  - **Jessica Bar-Hopp**
  - **Patrick Cassidy**
  - **Carly Edwards**
  - **Lynn Gold**
  - **Taylor Prickett**
  - **Alex Thomas**
- **Undergraduate Assistants**
  - **Jacqueline Chiari**
  - **Austin Riley**
  - **Katie Strickland**
  - **Josh Wiliams**

**NATIONAL ADVISORY BOARD**

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  American Association of Community Colleges
- **Jillian Kinzie**
  Center for Postsecondary Research, Indiana University (NSSE Institute)

**Term Ending 2014**
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  Association of American Colleges and Universities
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  Iowa State University
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- **Hunter Boylan**
  National Center for Developmental Education
- **Denise Rode**
  Northern Illinois University
- **Lemuel Watson**
  University of South Carolina
PROPOSAL REVIEWERS

The National Resource Center would like to thank the following members from our co-hosting institutions, advisory board, and colleagues in our network for serving as proposal reviewers.

Aimi Moss
University of Michigan-Flint
Amy Pardo
Mississippi University for Women
Andy Person
Mercy College
April Chatham-Carpenter
University of Northern Iowa
April Perry
Western Carolina University
Benjamin Perlman
Emory University
Betsy Barefoot
John N. Gardner Institute for Excellence in Undergraduate Education
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Graceland University
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Missy Korduner
Louisiana State University
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Georgia State University
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University of Cincinnati
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Brooklyn College - CUNY
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University of South Carolina
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York University
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Eastern Michigan University
Sarah May Clarkson
Juniata College
Teresa Huether
St. Louis Community College
Tracey Glaesgen
Missouri State University
Tracy Skipper
University of South Carolina
William Vanderburgh
Wichita State University

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Duke University
Mark Amos
Southern Illinois University
Catherine Andersen
Gallaudet University
Christian Anderson
University of South Carolina
Jenny Bloom
University of South Carolina
Rachel Boon
Ivy Tech Community College
Rozana Carducci
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Loyola Marymount
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NACADA
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Julie Schultz
The Ohio State University
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Front Range Community College
Mike Siegel
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Brian Sponsler
NASPA
Randy Swing
Association for Institutional Research
Dale Tampke
University of North Texas
David Thompson
Kennesaw State University
Wendy Troxel
Illinois State University
Tracey Walterbusch
The Ohio State University
Matthew Weigand
University of Buffalo
Alexis Wesaw
NASPA

Please join the conference conversation on Twitter: @NRCFYESIT #SIT13
EXHIBITOR INFORMATION

The International Conference on The First-Year Experience welcomes commercial and non-profit exhibitors. The exhibit area is located in the Grand Ballroom Foyer near the conference registration area. Exhibitors registered at the time of printing are listed below.

EXHIBITOR HOURS
You will have the opportunity to visit with exhibitors during the exhibit hours below:

<table>
<thead>
<tr>
<th>Day</th>
<th>Saturday, October 19, 2013</th>
<th>Sunday, October 20, 2013</th>
<th>Monday, October 21, 2013</th>
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<td>7:30 am – 12:00 noon</td>
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<td>1:30 pm – 5:00 pm</td>
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Bedford/St. Martin’s
At Bedford/St. Martin’s, we have always known that what happens in the classroom matters and that a good class, a good teacher, and good content have the power to change the world—one student, one idea at a time. We publish top-quality books and media across the disciplines of English, history, communication, music, and college success. In college success, we are proud that our authors are the leading experts on the first-year experience: John Gardner, Jerome Jewler, and Betsy Barefoot.

CPCC Press
CPCC Press is a publisher of faculty authored books, textbooks and supplementary workbooks at Central Piedmont Community College in Charlotte, NC. Our esteemed authors represent a myriad of degrees and disciplines, and have written books ranging from biographies, to language instruction, academic student success and mortgage lending. CPCC Press works educate, spark conversation and expand the mind, making life more interesting.

Growing Leaders
Growing Leaders’ mission is to turn ordinary students into growing leaders who will transform society. This is accomplished by providing character-based leadership training and resources targeted specifically for the millennial generation, which includes young people born between 1984 and 2002. The bull’s-eye of this target is students ages 12-24 who are in middle school, high school and college. Growing Leaders helps these emerging leaders discover their strengths, learn effective people skills, and develop a vision for their future.

H&H Publishing
Explore our research based assessments, textbooks, and online courses to improve your students’ study strategies. Weinstein’s “LASSI” and “LASSI Modules,” Walter Pauk’s “Essential Study Strategies,” and our eight-page study skills booklets are just a few of the quality products you will discover when you visit our booth.

National Resource Center for The First-Year Experience and Students in Transition
The National Resource Center for The First-Year Experience and Students in Transition focuses on enhancing the learning and success of all college students, hosts a series of national and international conferences, workshops, institutes; engages in research; publishes a scholarly journal, books, and an electronic newsletter; maintains a website; and hosts electronic listservs.

Noel-Levitz
A trusted partner to higher education, Noel-Levitz helps campuses reach and exceed their goals for student retention and completion, providing cost-effective assessments, analytics, and consulting services. Noel-Levitz convenes conferences and produces research, articles, and other resources to help campus leaders analyze enrollment trends and discover more effective strategies.

Partridge Hill Publishers
Partridge Hill Publishers was established in response to the need for research-based materials that facilitate student achievement. Its 3rd edition of Self-management Management for College Students: The ABC Approach, which is based on a Marist College program that consistently demonstrates higher student retention and success rates, is discounted for conference participant at www.abcself-management.com/2013-conference.html.

Saturday, October 19, 2013
4:00 pm – 7:30 pm

Sunday, October 20, 2013
7:30 am – 12:00 noon
1:30 pm – 5:00 pm

Monday, October 21, 2013
7:30 am – 12:00 noon

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Bedford/St. Martin’s
At Bedford/St. Martin’s, we have always known that what happens in the classroom matters and that a good class, a good teacher, and good content have the power to change the world—one student, one idea at a time. We publish top-quality books and media across the disciplines of English, history, communication, music, and college success. In college success, we are proud that our authors are the leading experts on the first-year experience: John Gardner, Jerome Jewler, and Betsy Barefoot.

CPCC Press
CPCC Press is a publisher of faculty authored books, textbooks and supplementary workbooks at Central Piedmont Community College in Charlotte, NC. Our esteemed authors represent a myriad of degrees and disciplines, and have written books ranging from biographies, to language instruction, academic student success and mortgage lending. CPCC Press works educate, spark conversation and expand the mind, making life more interesting.

Growing Leaders
Growing Leaders’ mission is to turn ordinary students into growing leaders who will transform society. This is accomplished by providing character-based leadership training and resources targeted specifically for the millennial generation, which includes young people born between 1984 and 2002. The bull’s-eye of this target is students ages 12-24 who are in middle school, high school and college. Growing Leaders helps these emerging leaders discover their strengths, learn effective people skills, and develop a vision for their future.

H&H Publishing
Explore our research based assessments, textbooks, and online courses to improve your students’ study strategies. Weinstein’s “LASSI” and “LASSI Modules,” Walter Pauk’s “Essential Study Strategies,” and our eight-page study skills booklets are just a few of the quality products you will discover when you visit our booth.

National Resource Center for The First-Year Experience and Students in Transition
The National Resource Center for The First-Year Experience and Students in Transition focuses on enhancing the learning and success of all college students, hosts a series of national and international conferences, workshops, institutes; engages in research; publishes a scholarly journal, books, and an electronic newsletter; maintains a website; and hosts electronic listservs.

Noel-Levitz
A trusted partner to higher education, Noel-Levitz helps campuses reach and exceed their goals for student retention and completion, providing cost-effective assessments, analytics, and consulting services. Noel-Levitz convenes conferences and produces research, articles, and other resources to help campus leaders analyze enrollment trends and discover more effective strategies.

Partridge Hill Publishers
Partridge Hill Publishers was established in response to the need for research-based materials that facilitate student achievement. Its 3rd edition of Self-management Management for College Students: The ABC Approach, which is based on a Marist College program that consistently demonstrates higher student retention and success rates, is discounted for conference participant at www.abcself-management.com/2013-conference.html.
Journal of The First-Year Experience & Students in Transition

A semiannual refereed journal providing current research and scholarship on significant student transitions. The primary purpose of the Journal is to disseminate empirical research findings on student transition issues, including:

- Explorations into the academic, personal, and social experiences—such as outcomes related to success, learning, and development—of students at a range of transition points throughout the college years. These transitions consist of, but are not limited to, the first college year; the transfer transition, the sophomore year; the senior year and transition out of college; and the transition to graduate work;

- Transition issues unique to specific populations (e.g., nontraditional, traditional, historically underrepresented students, transfer students, commuters, part-time students); and

- Explorations of faculty development, curriculum, and pedagogical innovations connected to any of the transitions identified above.

To submit or subscribe, please visit www.sc.edu/fye/journal

Mark Your Calendar

January 27 - February 28, 2014
Online Course: Developing a Writing Practice for Programatic and Professional Advancement

February 6 - 10, 2015
34th Annual Conference on The First-Year Experience®
Dallas, Texas

February 15 - 18, 2014
33rd Annual Conference on The First-Year Experience®
San Diego, California

April 4 - 6, 2014
Institute on Creating Effective Learning Partnerships for the Success of Returning Veterans
Columbia, South Carolina

Supporting and advancing efforts to improve student learning and transitions into and through higher education.

www.sc.edu/fye | 803.777.6029

Please join the conference conversation on Twitter: @NRCFYESIT #SIT13
### PRECONFERENCE WORKSHOPS - SATURDAY, OCTOBER 19

<table>
<thead>
<tr>
<th>W-1</th>
<th>Sophomore Explore! – Identifying and Supporting the Developmental Needs of Sophomore Students</th>
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<tbody>
<tr>
<td>Heather Johnston Welliver, Associate Director for Academic Support and Enrichment</td>
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<td>Denison University</td>
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<td>Jennifer Grube Vestal, Associate Dean of Students and Director of Academic Support and Enrichment</td>
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<tr>
<th>W-2</th>
<th>Proving and Improving: Assessment of Students in Transition</th>
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<tr>
<td>Jennifer R. Keup, Director of the National Resource Center for The First-Year Experience and Students in Transition</td>
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<td>University of South Carolina</td>
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<tr>
<th>W-3</th>
<th>Planning for Student Transitions Across the Undergraduate Years</th>
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<tr>
<td>John N. Gardner, President - John N. Gardner Institute for Excellence in Undergraduate Education; Senior Fellow, National Resource Center for The First-Year Experience and Students in Transition</td>
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<td>University of South Carolina</td>
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<tr>
<td>Betsy O. Barefoot, Vice President and Senior Scholar - John N. Gardner Institute for Excellence in Undergraduate Education; Fellow, National Resource Center for The First-Year Experience and Students in Transition</td>
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<th>W-4</th>
<th>Creating Transfer Student Pathways</th>
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<td>Janet L. Marling, Executive Director</td>
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<td>National Institute for the Study of Transfer Students</td>
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<td>Mark Allen Poisel, Vice President for Student Affairs</td>
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<td>Georgia Regents University</td>
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<th>W-6</th>
<th>Transitioning Students into Globally Competent Citizens: Strategies for the First Two Years</th>
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<tr>
<td>Chris Caplinger, Director of the First-Year Experience</td>
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<td>Georgia Southern University</td>
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<tr>
<td>Steven Elliott-Gower, Director of the Honors Program and Associate Professor of Political Science</td>
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<td>Georgia College</td>
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<tr>
<td>Keisha L. Hoernner, Associate Dean in University College</td>
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<tr>
<td>Kennesaw State University</td>
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<tr>
<td>Ralph J. Rascati, Professor of Biology, Associate Vice-President for Advising, Retention and Graduation Initiatives and Dean of University College</td>
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<td>Kennesaw State University</td>
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### ADDITIONAL REGISTRATION FEES REQUIRED FOR PRECONFERENCE WORKSHOPS

Lunch is provided for preconference workshop participants

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**Opening Session with Keynote Address**

**Looking Back and Looking Around: Transition Fundamentals and Success Principles as Object Lessons**

5:30 pm – 7:00 pm | Grand Ballroom B

**MARY STUART HUNTER**

Associate Vice President and Executive Director, National Resource Center for The First-Year Experience & Students in Transition University of South Carolina

Research and information on best practices for student success has evolved and proliferated over the recent decades and now guides our work with students in transition. There exists a rich foundation upon which our work is built. However, as educators we are all-too-frequently so immersed in our work to enhance student success that we fail to see that widely held principles of student success can be instructive to us as educators and humans as well. The 20th anniversary of the Students in Transition Conference is a perfect time to look back and look around.

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**OPENING RECEPTION** | 7:00 pm – 7:45 pm

Grand Ballroom Foyer

Co-sponsored by: Kennesaw State University
Institutional Excellence for Students in Transition Award

The National Resource Center for The First-Year Experience and Students in Transition is committed to setting the standard for excellence in supporting students at critical junctures in the educational pipeline beyond the first year. We also seek to promote intentional and integrative connections within and across institutions and educational sectors to enhance the student transition experience. In light of these core commitments, the National Resource Center is pleased to announce a new award recognizing Institutional Excellence for Students in Transition. The award will be presented annually to institutions that have designed and implemented outstanding collaborative initiatives enhancing the entire undergraduate experience. Award recipients will have demonstrated the effectiveness of the initiative in supporting student success, learning, and development at a variety of transition points and in responding to unique institutional needs.

Each award recipient will receive:

- Two complimentary registrations to 21st National Conference on Students in Transition to include at all conference sessions and meal functions and preconference workshops on a space available basis.
- Recognition at the 21st National Conference on Students in Transition, including the presentation of a plaque during the conference, a half-page announcement in the conference program booklet, and slides(s) highlighting award recipients in multimedia presentations during plenary sessions.
- Presentation of a poster session during the conference featuring components of the award-winning initiative(s) and institution.
- Recognition in a national higher education media outlet: in the National Resource Center’s online newsletter (E-Source for College Transitions), and on the Center’s web page, listservs (i.e., SOPH List, SYE List, TYE, and GRAD List), and social media channels.
- Distribution of press releases recognizing award recipients to national, regional, and institutional higher education media outlets.

More information regarding the award will be available at www.sc.edu/fye by May 1, 2014.

Resources on the Senior Year

NEW RELEASE!
Writing in the Senior Capstone: Theory & Practice
Lea Masiello and Tracy L. Skipper
ISBN: 978-1-889271-87-3. 156 pages. $30.00

The Senior Year: Culminating Experiences and Transitions
Mary Stuart Hunter, Jennifer R. Keup, Jillian Kinzie, and Heather Miettina, Editors

2011 National Survey of Senior Capstone Experiences:
Institutional-Level Data on the Culminating Experience
Ryan D. Padgett & Cindy A. Kilgo
ISBN 978-1-889271-86-6. 98 pages. $20.00

SAVE 10% Plus FREE SHIPPING. Code: SIT2013
During fall 2012, a course was piloted at Rider University with the broad goal of better preparing first-year theatre students to tackle course content by first understanding how to study deeply, think critically, and write clearly about a narrow subject. Within the class were embedded college orientation topics, such as stress management, time management, and academic advising. Working with a small cohort of 18 first-year theatre majors, the course was able to deliver on these objectives by presenting exciting subject matter, nurturing underdeveloped skills, and challenging students to reach for a high bar of success.

CR-2 Underrepresented Students’ Perception of Their Second Year in College
West Paces

**Dena Kniess**
Assistant Professor, Department of Counseling and Student Development
**Eastern Illinois University**

The majority of retention efforts have focused on the first year of college; however, many students leave college after their sophomore year. While recent studies on the second year have identified broad concerns, little is known about the second-year experience of underrepresented students and whether their issues are similar or different compared to the larger population of sophomores. This program will focus on the results from research conducted as part of a 2013 dissertation. Implications for practitioners in higher education will be shared.

R-3 Leading in Transition: Conversations With Stakeholders
Managing Student Success Transitions in Higher Education
Habersham

**Joan Leichter Dominick**
Senior-Year Seminar Coordinator
**Rebecca Casey**
Chair, Department of University Studies
Kennesaw State University

Come join this roundtable discussion exchanging experience, insights, and innovative ways stakeholders are leading and managing student success in higher education. Whether you are a seasoned leader, emerging leader, or considering joining the ranks, come and share your ideas. The roundtable is designed to bring together leaders of student services, academic departments, colleges, programs, and courses to exchange strategies for facilitating student transition experiences.

CT-4 Sophomore Successes and Challenges: Creating a Second-Year Program at a Large Public University
Tuxedo

**Mike O’Neal**
Director, Second-Year Programs
**Miami University**

This session will look at the history, successes, and challenges of creating a second-year program at Miami University—a large, state university in Ohio. The program was created in 2008 and is housed in the Dean of Students Office. Through collaboration with other student affairs offices, the Office of Second-Year Programs offers developmental programs for the entire population of 3,300 sophomores and is now focusing on new initiatives to provide academic experiences specifically for this population.
CI-5 Putting the Community Back in Community College
Chastain
Lin Mendoza
Success Coach
C. Dane Peterson
Math Success Coach
Central Carolina Community College

How can a community college flip the student perspective from dissatisfied to engaged? Central Carolina Community College hired a team of innovators and established a College Success Center (CSC). Funded by a Title-III grant, the CSC designed and executed a first-year experience program (FYE) to boost student persistence, retention, completion, and satisfaction. Efforts included (a) implementing an FYE course into every associate degree program of study, (b) using an early-alert system to monitor and support students, and (c) planning for students’ end goals from the beginning of their academic careers. These strategies help maintain student accountability while fostering long-term connections between students, faculty, and staff.

CI-6 An Integrated, Innovative First-Year Academic Program
Grand C
Martha Billips
Associate Dean of the College for First-Year Academic Programs and Advising
Michael Covert
Associate Vice President for Retention
Associate Dean of Students
Transylvania University

Building upon high-impact practices, Transylvania University recently redesigned its first-year experience and institutional calendar with the overarching goal of acculturating new students into a scholarly community. A newly created August term, including a three-week full-credit seminar and cocurricular programming, is the first of five tightly integrated components. Following August term, students continue to develop academic skill sets, attitudes, and values during a two-semester first-year seminar, which culminates in an independent research project. Students also receive integrated academic advising and course credit for attending intellectual and cultural events on campus as part of a convocation series requirement.

CI-7 Ka`ie`ie Degree Pathway Program: Transferring Through the University of Hawai’i Channels
Grand D
Nicole Iwasaki
Transfer Specialist and Advisor
University of Hawai’i at Manoa and Kapi’olani Community College
Karmi Minor-Flores
Counselor
Kapi’olani Community College

As more students begin their academic journey at community colleges prior to attending a four-year university, it is important to establish a smooth transfer process. The Ka`ie`ie Degree Pathway program is designed to provide a smooth transition from one institution to another, allowing students to accomplish their academic goals. Using the model implemented between Kapi’olani Community College and University of Hawai’i at Manoa, this session will highlight the Pathway program’s mission, history, and future direction as well as the benefits to students and techniques for collaborating with other institutions.

R-8 Writing in the Senior Capstone: Strategies for Supporting Learning, Development, and Career Preparation
Grand E
Tracy Skipper
Assistant Director for Publications, National Resource Center for The First-Year Experience and Students in Transition
University of South Carolina

Surveys of employers continually highlight the need for better communication skills among recent college graduates. Yet, writing instruction in higher education serves far more than a transactional purpose. Writing facilitates learning, helps students gain skills in analysis and synthesis, and supports a range of other personal and intellectual developmental outcomes also important to employers. The presenter will engage attendees in a discussion of writing in senior seminars and capstone courses. Possible topics include linking course goals and writing assignments, challenges associated with writing, effective writing assignments, benefits to students, and other issues identified by participants.

CT-9 What Did I Learn in That Core Class? Ask a Psychologist
Peachtree
Joshua Williams
Assistant Professor of Psychology
Nancy McCarley
Assistant Professor of Psychology
John Kraft
Associate Professor of Psychology
Armstrong Atlantic State University

One goal of core curricula in higher education is to instill an intellectual curiosity in students and help them become intellectually well-rounded. Most institutions offer such a curriculum from which students select courses to build an interdisciplinary degree. However, more effort should be made to help students reactivate and connect the topics of a core curriculum to foster long-term learning. The presenters will argue that a psychology-specific capstone course, History and Systems of Psychology, can serve as an effective means to unite a core curriculum for any major.
10:15 am-11:15 am

CI-10 Using Current Research and Trends to Strengthen a Program for Sophomores
East Paces
Scott Wojciechowski
Residential Life Coordinator for Sophomore Resources and College Houses
Gettysburg College
As part of Gettysburg College’s learning plan model, the Sophomore Resources program provides the foundation for second-year students to own their experience by uniting several campus resources and creating specific messaging and opportunities. This session will detail the creation of the cross-divisional advisory board, explain the structure and staffing of the program, feature the major elements of the Sophomore Learning Plan, highlight specific initiatives designed for sophomores, and summarize the assessment of our outreach. The information will be beneficial for institutions looking to begin or bolster a second-year program.

CT-11 Transitioning From College to Work: Ensuring Great Expectations Are Realistic Expectations
West Paces
Paul Hettich
Professor Emeritus
DePaul University
Many graduates enter the workforce facing three crises: debt, unemployment or underemployment, and high expectations. According to recent research by Philip Gardner, they also enter with a sense of entitlement, unrealistic expectations, and a lack of workplace readiness. This interactive session will identify key sources of unrealistic expectations (e.g., Generation Me culture, faulty economic assumptions, workplace focus on skills vs. course content, radically different organizational cultures). In addition, the presenter will describe opportunities, when connected to the workplace, that students can pursue to establish realistic expectations and enhance career readiness (e.g., job monitoring, career counseling, internships, participation in organizations, skill-based elective coursework).

R-12 Identifying Your Students’ Transition Issues and Tips on How to Lead Meaningful Campus Conversation
Habersham
Lisa Marie Kerr
Assistant Provost; Enrollment Management
Auburn University at Montgomery
Lisa Will
Academic Advisor, Coordinator
Rose State College
Do you know the primary transition issues your students face? This roundtable will provide an opportunity to brainstorm with colleagues to identify and/or develop meaningful interventions for the primary student transition issues on your campus. Participants will be grouped with peers from like institutions and guided through a well-defined small-group conversation process designed to identify pressing transition issues. Finally, attendees will receive tips from the field and guidance on how to facilitate similar meaningful conversations with colleagues at their home institutions.

CR-13 Promoting Native American Student Recruitment and Retention in Higher Education
Tuxedo
Richard Mosholder
Assistant Professor of Psychology, Department of First-Year Experiences
Kennesaw State University and Utah Valley University
Bryan Waite
Program Director for Global/Intercultural Engagement
Associate Professor of Secondary Education
Chris Goslin
Assistant Professor of College Success Studies
Utah Valley University
This study was conducted over a four-year period at a large, open-enrollment university in the Intermountain West. A review of the literature informed a mixed methods approach to measuring the perceptions of Native American college students about education and their institution. A National Science Foundation grant was used to develop curricula and programs to address the concerns of students and the opportunities for institutional improvement. The third annual study survey was analyzed quantitatively and the results were reviewed in student focus groups, providing insight into the strategies leading to lasting institutional change.

CI-14 Got Major? Finding Purpose Through Kent State University’s Exploration Plan
Chastain
Jon Steven Antalvari
Assistant Director, Exploratory Advising Center
Kent State University
In 2010, Kent State University implemented a policy requiring all undecided students to be in a degree-granting major by the completion of 45 credit hours. The impetus for the policy was institutional data showing students in degree-granting majors were being retained at a higher rate. The Exploration Plan was designed to enrich the first-year experience for undecided students and to expedite a shift into a degree-granting program within the first three semesters. The Exploration Plan has six intentional and often high-impact components intended to propel a student from I don't know to declared in 45 credit hours.
SIT 2013

SUNDAY, OCTOBER 20

CI-15 Using Student-Facilitated Discussion Groups to Revise a First-Year Seminar
Grand C
Matthew Martin
Professor of English, Director of WISE
Deidra Donmoyer
Associate Professor of Communication
Director of Women’s Studies
Wesleyan College
Jeff Prudhomme
Vice President and Fellow
Interactivity Foundation

Wesleyan College partnered with the Interactivity Foundation (IF) to revise WISE 101, the first half of the mandatory two-semester first-year seminar sequence. One third of the class was devoted to student-facilitated discussions where students integrated ideas from course texts as well as their own writings and worked to explore those ideas as divergently as possible. This session will give participants the chance to experience the IF facilitated discussion process, learn how the strategy was used in WISE 101, hear preliminary observational and survey data about its impact on students, and collaboratively explore the value of this innovative technique on other campuses.

CR-16 So, You Think You Know Me?
Grand D
Holly Craider
Faculty, Speech Communications; Interim Manager, Next Generation Learning
Cuyahoga Community College

Aware of the potential for first-generation students to experience culture shock upon entering the college environment, the question that drove this study was, How do these students succeed despite the challenges experienced in their past and present and in light of their goals for their future? Studies that move beyond simply collecting numerical data (e.g., enrollments, grades, test scores) are needed to better understand the complex issues that affect underserved students’ academic achievement. This study looked forward, backward, inward, and outward to understand the experiences of first-generation students as they strive to be academically successful in an unfamiliar system (i.e., college). Attendees will enter into the world of a first-generation college student and hear their stories from their mouths—not numbers.

CT-17 The Critical First Semester: Creating a Student-Centered Advising Program That Works
Grand E
Cathy Vaughan
Coordinator of First Semester Experience Program
Director of Counseling Services
Aimee Wilkerson
Director of Enrollment Management
Madisonville Community College

The Madisonville Community College’s new student orientation process produced significant gains in student success. The changes required a high degree of collaboration and cooperation between academic affairs and student affairs personnel and the elimination of decades-old policies that served the needs of the college—not the student. Implemented in 2005, the First Semester Experience program takes the orientation process from a registration exercise to a relationship-building enterprise, preparing students for the expectations of postsecondary education.

CI-18 The Second Chapter: How Libraries Can Support Sophomores Through Information Literacy Instruction, Assessment, and Faculty Partnership
Peachtree
Jennifer Stout
Undergraduate Research Librarian
Virginia Commonwealth University

Many colleges (rightly) focus on information literacy in the first year. However, students benefit immensely from support during their second year as they move toward courses that are unique to their major. With a strong instruction program and the cooperation of University College, the librarians at Virginia Commonwealth University (VCU) are able to work with nearly 100% of sophomore students. This session will cover how VCU librarians support student success during the transitional time between VCU’s robust first-year experience and when students enter their majors. Library instruction, assessment, and building partnerships with UNIV 200 faculty will be discussed.

CT-19 The Sophomore Psyche: Teaching Resilience in the Second Year
Grand D
Nora Scobie
Assistant Director for Advisor Development
University of Louisville

The second-year itch is a time when students try to make sense of their own identities, new relationships, the relevance of the curriculum, and where they fit in the world. This crisis of self can be a time of awakening or a recipe for disaster. In today’s world, students need both intellectual and emotional foundations for dealing with the second year and beyond. Moral and ethical reasoning develops both inside and outside the classroom. Join the presenter in exploring techniques to help students increase independent thought and intellectual perseverance, adapt to change, and create an individual vision for the future.

Lunch On Your Own | 11:15 am – 12:15 pm
Aspects of the college transition, particularly those in the first college year and senior year, have been well documented; however, the progression through higher education can involve many more diverse transitions. This presentation will draw from the forthcoming book, *College Students in Transition: An Annotated Bibliography*, to (a) explore seminal and contemporary research involving myriad student transitions in and through higher education (beyond those of traditional first-year students); (b) discuss the implications of this work for practice; and (c) identify emerging areas of research, policy, and practice for faculty and staff who work with students in transition.
CI-24 Parallel Transition: How the University of Florida Uses E-Learning to Develop Online Orientation Programs Complimentary to In-Person Orientation
Chastain

Kristopher Klann
Assistant Director
University of Florida
To aid in the transition of incoming students, the Dean of Students Office at the University of Florida used an e-learning platform to develop online orientation programming that complemented the on-campus programs while assisting special populations in their acclimation to campus. This session will discuss (a) how orientations can be adapted to the needs of individual populations, (b) the design of interactive and engaging orientation sessions for students, (c) the use of student assessment to continue to modify and improve orientations, and (d) the development of orientations to assist with the transitional needs of special populations.

CR-25 Developmental Meaning-Making Dynamics of Emancipated Foster Care Youth Transitioning Into Higher Education: A Constructivist-Grounded Theory
Grand C

Jacob Okumu
 Resident Director, Clinical Resident
Ohio University
This session explores developmental meaning-making dynamics of emancipated foster youth transitioning into higher education and the role college campus environments play in that process. The presenter proposes grounded theoretical conceptualizations to the college student development theoretical base by acknowledging the needs, goals, and values of disenfranchised college students. In addition, the session offers mentoring tools that empower emancipated foster youth to claim the authority of their own experiences, liberate themselves from debilitating constraints, and self-author their unique developmental paths.

CI-26 Institutional Collaborations to Support College Completion
Grand E

Tiffany Bellafant Steward
Director, First-Year Students
University of Central Florida
Wayne Jackson
Director, Multicultural Academic and Support Services
East Paces
The Gardner Institute has collected and analyzed data on high-enrollment “killer” courses—classes that serve either as roadblocks or gateways to the major. Large numbers of first-year students receive Ds and Fs or withdraw from these courses each year. For the past 10 years, the Gardner Institute has collected and analyzed data on high-enrollment first-year courses. In this session, the presenter will review these data and engage participants in a discussion on why this problem persists and how institutions can help students be more successful in high-risk gateway courses.

CT-27 Killer Courses: Roadblocks to First-Year Academic Success and Retention
Peachtree

Betsy Barefoot
Vice President and Senior Scholar
Gardner Institute for Excellence in Undergraduate Education
In recent years as part of the national focus on the Completion Agenda, concerns have surfaced about unsatisfactory student performance in high-enrollment “killer” courses—classes that serve either as roadblocks or gateways to the major. Large numbers of first-year students receive Ds and Fs or withdraw from these courses each year. For the past 10 years, the Gardner Institute has collected and analyzed data on high-enrollment first-year courses. In this session, the presenter will review these data and engage participants in a discussion on why this problem persists and how institutions can help students be more successful in high-risk gateway courses.

E-72* Habitudes for the Journey…For Students in Transition
Habersham

Tim Elmore
President and Founder
Growing Leaders, Inc.
This session is based on the newest installment of the series, Habitudes: Images that Form Leadership Habits and Attitudes. It’s designed for students in transition. First-year students need safe places to talk about the transition they have experienced in college. This book introduces principles for navigating pivotal life decisions, each based on an image, a conversation and an experience. We’ll offer practical tips on connecting with students over the most important conversations they will have during their first year.
SUNDAY, OCTOBER 20

CI-29 Transitioning From Knowledge Consumers to Knowledge Producers: Research and Community Placements as Transition Experiences
West Paces
Sarah Robinson
Administrator, Interdisciplinary Programs
Patricia Chow-Fraser
Director, Life Sciences Program
Kimberly Dej
Associate Director, Life Sciences Program
McMaster University
Universities are recognizing the importance of integrating experiential learning opportunities into traditional degree programs. Providing students with opportunities for self-directed and interdisciplinary learning offers a means to help students transition from knowledge consumers to knowledge creators. This presentation will discuss the creation of a series of experiential and research placement courses at McMaster University (Canada) that help fulfill degree requirements while also providing students with experiences that complement more traditional lecture-based courses.

CI-30 Transition to Full Admission
Tuxedo
Sarah Jones
Assistant Director First Year Experience
Helen Diamond Steele
Director of First Year Experience
Matt Varga
Assistant Professor, Counselor Education and College Student Affairs Department
University of West Georgia
University of West Georgia’s summer transition program, Ignite, is a four-week residential program for conditionally admitted students. Participates are provided necessary support and expected to fully engage in campus life while proving their academic readiness in the classroom. During this session, the presenters will discuss the key elements in planning and implementing a successful summer transition program and share how collaborative relationships with campus partners in academic and student affairs led to higher first-year student GPAs for program participants.

CI-31 Living Questions: Guiding Integration and a Sense of Purpose for Transformational Learning
Chastain
Elaine Gray
Learning Support Specialist
Appalachian State University
This session examines the intersections between transformational learning, critical thinking, and the cultivation of a students’ sense of purpose. The results of a recent study on the sense of purpose in first-year seminar students at three North Carolina State Universities will be presented along with a model for facilitating the use of living questions as a contemplative strategy for guiding a process of transformative learning. The presenter will offer activities, assignments, learning outcomes, language for rubric creation, and qualitative assessment methods for experiential learning.

CT-32 Collaborating for Long-Term Student Success: First-Year Experience and Career Services
Grand C
John Dahlstrand
Assistant Dean of Student Success
Amber Dickinson
First-Year Experience Coordinator
James Barracough
Career Services Specialist
Washburn University
The first-year experience (FYE) program at Washburn University is designed to assist students with their transition to college. Collaborative efforts between the office of the First-Year Experience and Career Services have enhanced opportunities for first-year students. This presentation will discuss (a) Career Services’ involvement with first-year seminars, (b) FYE and Career Service sessions at new student orientations, (c) peer educators as links to students and Career Services, and (d) Career Services’ role at Washburn’s first-generation student retreat. Through courses, services, and programs, the FYE office and Career Services are working together to make the Washburn experience a positive one.

CI-34 Transfer Student Living-Learning Community: Increasing Retention, Engagement and Connection to Campus Through a Unique Collaboration Between Housing and Academic Affairs
Grand D
Mary Von Kaenel
Associate Director for Transfer Academic Programs
Clemson University
TIGER Den is a living-learning community for new transfer students at Clemson University. In a unique collaboration with University Housing, the coordinator for TIGER Den and the Housing Community Director wrote a targeted curriculum for students in transition. Using a blended theoretical framework, the curriculum for students in TIGER Den combines resident advisor staff with upper-division transfer students in a semester-long series of events designed to promote academic and social integration. This session will provide the curriculum outline, discuss the theoretical framework, and present programmatic outcomes. Assessment rubrics will also be reviewed.

R-35 Creating Second-Year Programs: What Is Working on Your Campus?
Grand E
Mike O’Neal
Director, Second-Year Programs
Miami University
Many colleges and universities across the country are looking at the sophomore year as a key intervention point for student success as well as retention. While there may be great interest in the topic, little research exists on the success and challenges of creating second-year programs. In addition, there is no one-size-fits-all solution for all campuses. This roundtable discussion will be an opportunity for colleagues to find out what is working at other institutions across the country and to share insights on the unique challenges they may face.
CI-36 First-Generation Transition: An Innovative, Holistic Approach
Peachtree
Leslie Sans
Director, Campus Relations and Programming
The Suder Foundation-First Scholars Program
First-generation college students frequently lack the cultural capital necessary for a smooth transition to college. They often do not possess the knowledge, skills, and educational preparation needed to make the higher education system a comfortable environment. First Scholars® is currently implementing a holistic student success program at seven universities across the nation. The four-year framework, incorporating noncognitive assessments, guides first-generation students through key transitions pivotal to their success. Participants will engage in a rich discussion sure to provide innovative approaches to addressing first-generation students’ needs over the four-year college experience.

4:30 pm-5:30 pm

CR-37 Growth Mindsets and Productive Efforts That Lead to Increased Achievement and Learning
East Paces
Jan Wiersema
Senior Lecturer, Department of Natural Resource Ecology and Management
Barbara Licklider
Professor, School of Education
Janette Thompson
Professor, Department of Natural Resource Ecology and Management
Suzanne Hendrich
Professor, Department of Food Science and Human Nutrition
Cynthia Haynes
Associate Professor, Department of Horticulture
Iowa State University
The Academy for Leadership and Learning, a cross-disciplinary community of first-year learners, was created to help students develop learning, teamwork, and leadership skills. Typically during first semester, individuals transform from students who wait to be told what to do into more responsible learners—those who begin to take control of their own learning. As the result of this change appearing earlier than usual in the semester, a phenomenological research study was launched to uncover the key components most affecting these students’ transformations into responsible learners. During this session, the presenters will share lessons learned about developing responsible learners that are applicable to all students.

CR-38 Focused on the First Year: An Advising Initiative and Its Impact on Institutional Culture
West Paces
Jennifer Lee
Advisor, First Year Experience
Jessica Ha
Transfer Student Success Coordinator
Florida Institute of Technology
The role advisors play in a students’ transition cannot be overlooked. Identifying and understanding the needs of the whole student directly relates to improved retention, as academics alone do not encompass a first-year student’s experience. This session focuses on the creation and development of an initiative implemented at a small private technological university that used professional advisors to improve students’ successful transition and increase retention. This initiative has filled the gap that existed in the areas outside of academics that impact the first year and has led to institutional changes resulting in higher student satisfaction.

CR-39 A Better Boost: The Library’s Role in Academic Success
Tuxedo
Jean Cook
Instruction Librarian
University of West Georgia
In 2010, the Association of College and Research Libraries put out a nationwide call for librarians to measure the value of academic libraries. How are college libraries affecting the success of their students, and what might this mean for future retention, persistence, and graduation efforts? This presentation will cover the promising findings from several early researchers of this topic, including independent results of the presenter’s longitudinal study of 15,000 undergraduate students over 12 years.

CI-40 Successful Strategies to Increase Academic Success and Retention of African American Males in Higher Education
Chastain
Genesis Steele
Interim Director, African American Male Initiative
Keith J. Ware II
Campus Coordinator
St. Louis Community College
This session will demonstrate how programming designed to address the needs of African American male students can lead to positive outcomes in the areas of retention, academic success, and increased enrollment. Participants will learn about the St. Louis Community College African American Male Initiative and its comprehensive programming, which includes student support services, academic interventions, and peer and community mentoring opportunities. Many of the initiative’s key components can easily be implemented at other institutions.
What do we really know about motivation—where it comes from, and what sustains it? How do we account for motivational differences we see among students? Positive psychology scholars posit promising theoretical constructs for understanding why some students flourish while others flounder. In this session, participants will explore major findings from a decade of literature and consider corresponding implications for invigorating learners and learning environments. Attendees can expect to walk away with a deeper conceptual understanding of the underpinnings of motivation—including hope, grit, and psychological well-being—as well as practical suggestions for translating theory to practice.

This presentation will review the rooted beginnings and evolution of the Texas Lutheran University Peer Mentor Team. Discussion will focus on the recruitment and training process as well as the unique makeup of this team committed to working with students throughout their entire first year of college.

It seems that many faculty and staff today struggle with incongruities in their academic lives. Is it possible to sustain individual spirituality, authenticity, wholeness, and self-renewal in the academy in the 21st century? Do our institutional cultures fuel incongruence? In this session, participants will be encouraged to think deeply about their own beliefs and values and consider how their institutional cultures foster authenticity or perhaps generate intrapersonal conflict. Discussion will revolve around these issues.
The National Resource Center for The First-Year Experience and Students in Transition invites applications for the 2014-2015 Paul P. Fidler Research Grant. The Paul P. Fidler Research Grant is designed to encourage the development and dissemination of knowledge to improve the experiences of college students in transition.

With an award package that includes a stipend, travel to two national conferences, a presentation at a national conference, and priority consideration for publication, the Paul P. Fidler Research Grant supports and promotes research with the potential to have a national impact on student success. The Center invites applicants to submit proposals addressing a variety of topics, which may include underrepresented student populations, community colleges, advising, transfer and articulation, career development, and other issues related to college student transitions.

Comprehensive Award Package

> Stipend of $5,000
> Travel to the 21st National Conference on Students in Transition, October 2014, at which the award will be presented
> Announcement and recognition at the 21st National Conference on Students in Transition plenary session
> Travel to the 22nd National Conference on Students in Transition, October 2015, at which the research findings will be reported
> Announcement on the National Resource Center webpage, listservs, and print publications
> Priority consideration for publication by the National Resource Center for The First-Year Experience and Students in Transition

Past Recipients

2012-13 Award – Jacob Okumu
Developmental Meaning-Making Dynamics of Emancipated Foster Care Youth Transitioning into Higher Education: A Constructivist-Grounded Theory

2011-12 Award – Kristin Moser
Redefining Transfer Student Success: Transfer Capital and the Laanan-Transfer Students’ Questionnaire (L-TSQ) Revisited

2010-11 Award – Paul J. McLoughlin II
High-Achieving Low-Income Students: How Low-Income Students on Full Financial Aid are Navigating an Elite College

2009-10 Award – Rachel Smith
Connected in Learning: A Mixed Methods Study of First-Year Students’ Academic and Social Networks

2008-09 Award – Maryellen Mills
Student Success Course Participation and Engagement Among Part-Time and Full-Time Community College Students

Application and Submission Deadline
Grant submission will officially open on April 1, 2014. The application form may be accessed at www.sc.edu/fye/research/grant/proposal and must be submitted electronically using the online form by July 1, 2014.

www.sc.edu/fye/research/grant/proposal
Join us in congratulating . . .

2013-2014 Paul P. Fidler Research Grant Recipients

Examining the Importance of Attachment and Engagement in Predicting GPA across Stages of Transfer Student Transition

Forrest Lane
Georgianna Martin

The Paul P. Fidler Research Grant is designed to encourage the development and dissemination of knowledge that has the potential to improve the experiences of college students in transition.

Comprehensive Award Package
The Paul P. Fidler Research Grant award includes a cash stipend, travel to two national conferences, a presentation at a national conference, and priority consideration for publication.

Application Procedures
The application and proposal will be available for download at www.sc.edu/fye on April 1, 2014. Completed applications must be received by 11:59 pm EST, July 1, 2014. E-mail: NRCrsrcrch@mailbox.sc.edu

Research on College Students in Transition

COMING SOON! Ships Early November 2013
College Students in Transition: An Annotated Bibliography
Stephanie M. Foote, Sara E. Hinkle, Jeannine Kranzow, Matthew D. Pistilli, La’Tonya Rease Miles, & Janelle G. Simmons, Editors
ISBN: 978-1-889-27187-3. $30.00

Andrew K. Koch, Editor-in-Chief, Stephanie M. Foote, Sara E. Hinkle, Jennifer R. Keup, and Matthew Pistilli, Editors

Crafting and Conducting Research on Student Transitions
Jean M. Henscheid and Jennifer R. Keup
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Beyond the First College Year

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ISBN: 978-1-889271-83-5. 216 pages. $35.00

Monograph No. 54 | Transfer Students in Higher Education: Building Foundations for Policies, Programs, and Services That Foster Student Success
Mark Allen Poisel and Sonya Joseph, Editors
ISBN 978-1-889-27171-2. 154 pages. $35.00

Monograph No. 55 | Students in Transition: Research and Practice in Career Development
Paul A. Gore, Jr. and Louisa P. Carter, Editors
ISBN 978-1-889271-73-6. 160 pages. $35.00

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Online Courses on The First-Year Experience® and Students in Transition

January 27 - February 28, 2014

Developing a Writing Practice for Programmatic and Professional Advancement
Instructor: Tracy L. Skipper
Assistant Director for Publications for the National Resource Center for The First-Year Experience and Students in Transition University of South Carolina

For many of us, the act of writing is a daunting proposition. Yet, it is a critical skill for meeting program objectives, demonstrating the efficacy of our work, and facilitating career advancement. This five-week course is designed to jump start a professional writing practice. Participants will learn general strategies for writing well, explore issues related to shaping and editing texts, and give and receive feedback on drafts in progress.

Register online at www.sc.edu/fye/oc | Courses limited to first 25 registrants.

Please join the conference conversation on Twitter: @NRCFYESIT #SIT13
PR-44 Transgenderism and the College Experience: Transitioning Challenges During Higher Education
Rodney Parks
Registrar
Elon University

This study uses a phenomenological case study approach to examine the unique experiences of two transgender students who began their transition during their college years at a large Southeastern university. Anecdotal evidence suggests that students are coming out as transgender on campuses across the country. With assistance from student personnel professionals, transgender students have the opportunity to contribute to institutional diversity and personal growth. As students transition, they face a number of challenges within campus environments, including a lack of access to health care, difficulties with campus facilities, and identity issues in the classroom. The researchers rely on dual instrumental case study methodology, collecting the experiences of male-to-female and female-to-male transgender students to shed light on the challenges and needs of this vulnerable student population. Recommendations are offered to help campus administrators address the needs of this growing student demographic.

PA-45 The Badge Experiment: Applying Classroom Learning and Behavior to Life and Career Skills
Joan Ledbetter
First-Year Experience Director
Georgia Highlands College

Positive peer-pressure, the power of positive-reinforcement, and the importance of showing appreciation are all familiar concepts, but what about the cognitive realization students can gain from seeing classroom actions put into career titles? Participants will learn how badges can inspire, encourage, and put a smile on students’ faces as well as help students translate classroom activities and assignments into real-world career skills. Instructors of all subjects can benefit from learning about and applying the badges concept. Study skills and career class instructors will especially see the benefits of applying peer reinforcement and career application to class activities.

PA-46 Transfer Learning Community: Supporting STEM Student Success
Timothy Scott
Associate Dean for Undergraduate Programs
Texas A&M University

Approximately 100 students transfer into the College of Science at Texas A&M University each year. Transfer students are academically talented and interested in STEM and provide opportunities to increase the STEM pipeline. Beginning Fall 2012, all transfer students are required to participate in a learning community during their first year. Based on the College’s NSF funded S-STEM program, essential components have been incorporated into the program as key for successful transfer, retention, and completion of bachelor’s degrees in STEM. This session will provide a detailed overview of the program which will include high impact practices, learning outcomes, and assessments utilized.
PA-47 Developing Growth Mindsets and Emphasizing Effort: Faculty and Student Development

Cynthia Haynes
Associate Professor, Department of Horticulture

Jan Wiersema
Senior Lecturer, Department of Natural Resource Ecology and Management

Suzanne Hendrich
Professor, Department of Food Science and Human Nutrition

Janette Thompson
Professor, Department of Natural Resource Ecology and Management

Barbara Licklider
Professor, School of Education

Iowa State University

A cross disciplinary team of instructors at Iowa State University believe that understanding the link between mindset about intelligence and academic effort can provide a strong foundation for achievement and life-long learning. Therefore, groups of students and faculty were engaged in regular lessons on mindset and effort throughout the year. Faculty designed syllabi and in-class activities to promote a growth mindset and engage in thinking about effort. Students were introduced to growth mindset concepts woven into course lessons and asked to reflect on their own meaning for mindset and academic effort. Activities and discussions about mindset and effort enhanced motivation to learn and ultimately succeed.

PA-48 A Comprehensive Approach to Promoting First-Year Success of Pre-Health Students

Erika Dumke
Director, Division for Health Sciences Diversity

Kevin Harris
Assistant Vice President, Health Sciences Academic and Diversity Affairs

Virginia Commonwealth University

The VCU Acceleration program at Virginia Commonwealth University (VCU) began in 2005 through a partnership between the Division for Health Sciences Diversity and the Office of Pre-Health Advising. The program was designed to promote interaction among students, from diverse backgrounds and who are interested in a wide array of health careers, to enhance their academic and professional preparation as they enter college. VCU Acceleration includes a unique blend of a summer prematriculation program and an academic year living-learning community. Discussion of the key components and results (e.g., first-year retention, graduation, matriculation to health professions programs) will be presented.

PA-49 What Happens After 25 Years? Trends of the National Survey of First-Year Seminars

Jessica Bar-Hopp
Graduate Assistant for Research, Grants, and Assessment

University of South Carolina

Using data collected over the past 25 years from the administration of the National Survey of First-Year Seminars, this poster session will examine the overall national picture of first-year seminars in the United States and current trends. General findings and the implications surrounding this significant transition will also be described and discussed.

PA-50 Engagement Orientation, and Retention: Using the CollegeScope Online Curriculum in a Freshman Seminar Course

Alyse Jones
Associate Professor of English

Georgia Perimeter College

Students can direct their own future with CollegeScope. Find out how to use an engaging and dynamic online curriculum, proven to increase student persistence and graduation rates. This session is for everyone working toward student success, including those associated with first-year experience programs, student success classes, or any at-risk students.

PA-51 Peer Mentoring: A Critical Component of the SEEK First-Year Experience at the City College of New York (CUNY)

Mara Washburn
Counselor/Assistant Professor

Ana Zevallos
Assistant Professor and SEEK Counselor

The City College of New York

This presentation will discuss the role of peer mentors in the first-year experience for educational opportunity program students at a large, public institution. Our program’s first-year experience consists of a summer pre-freshman program, learning communities, which include a fall college readiness course, and a spring workshop series. Peer mentors are in the classroom to share strategies for academic success, provide support, and serve as role models to students throughout their first year in college. Preliminary data indicates that first-year students find mentors to be useful and relevant and that mentors gain leadership and professional skills from this experience.

PA-52 Outdoor Orientation Experiences as a Successful Transition Program for First-Year Students

Sarah Robinson
Administrator, Interdisciplinary Programs

McMaster University

Transitioning to university can be both a stressful and an exciting time in a student’s life, during which they will be faced with many challenges. McMaster University has created the McMaster Outdoor Orientation & Student Experience to help facilitate our student’s transition to university life. This poster session will share our experiences in MOOSE from the perspective of one specific Science program involved since its inception in 2012. We will share our experiences with respect to the creation, administration, refinement, and evaluation of the program. We will also share student feedback with the conference audience.
The transition to college life is difficult for many students, but especially for those who are academically underprepared. For many years, postsecondary institutions provided academic support through remedial and/or developmental programs; however, recent mandates have resulted in many of these programs being dismantled or radically redesigned. In 2006, Middle Tennessee State University implemented a program to mainstream students with developmental requirements into college-level courses. The presenters will (a) describe the different curriculum models for mathematics (i.e., enhanced sections of general education mathematics courses) and English (i.e., a two-semester stretch model), (b) summarize assessment data, and (c) facilitate discussion to assist others considering similar initiatives.

CT-58 Using the CAS Standards to Assess Your Transfer Student Programs and Services
Chastain
Janet Marling
Executive Director
National Institute for the Study of Transfer Students (NISTS)
University of North Georgia
Melissa Mahan
Vice President for Student Affairs
Texas A&M University - San Antonio

One of the latest additions to the Council for the Advancement of Standards in Higher Education (CAS) is the Standards for Transfer Student Programs and Services (TSPS). These standards include “must” statements and guidelines to promote exceptional approaches to working with transfer students. Facilitated by two members of the CAS Board of Directors and using the CAS lens, this session will explore the standards and how they can be used to facilitate a full self-assessment process or as a benchmark for exemplary practice.
CR-59 Recent Evidence on Prevalence and Outcomes of Undergraduate Peer Leaders Working With First-Year Students: Results From Two National Surveys
Grand C
Dallin George Young
Assistant Director for Research, Grants, and Assessment
Jessica Bar-Hopp
Graduate Assistant
National Resource Center for The First-Year Experience and Students in Transition
University of South Carolina
Using information from the 2012 National Survey of First-Year Seminars and the 2013 National Survey of Peer Leaders, this session will explore both the use of undergraduate peer leaders in first-year seminars and the outcomes for these students. The presenters will engage participants in a discussion of the implications of the frequency at which institutions report using undergraduate students in first-year seminars and how student peer leader outcomes are influenced by this experience.

CI-60 Why Peer Mentors? Promoting Transfer Success
Grand E
Charlene Stinard
Director, Transfer and Transition Services
University of Central Florida
How do we help transfer students bridge the gap from one institution to another, assuring that their transition is smooth, seamless, and successful? University of Central Florida has a dynamic peer mentor program that promotes transfer success and persistence to graduation. This presentation focuses on the unique support peer mentors provide to transfer students before admission, during transfer orientation, and in students’ first semester. Participants will use a worksheet to help generate ways to think about roles peer mentors might play at their institutions.

CT-61 Meeting the Diverse Needs and Concerns of Seniors as They Transition to Life’s Next Challenge
Peachtree
Jenna Azar
Senior-Year Experience Manager
Muhlenberg College
All too often, as students prepare to step outside the supportive and structured environment of higher education, they face the seemingly insurmountable obstacles of a competitive job market, increased student debt, and concerns over their path to professional fulfillment. The senior-year experience at Muhlenberg College offers deeply interconnected program models and highly defined, yet entirely customizable opportunities for seniors as they prepare for life’s next challenge. This session will focus on the development of three distinct but cohesive campus initiatives that offer a broad range of transition and reflection tools and resources for seniors throughout their culminating year.

CI-62 Igniting Transfer Student Success Through Strategic Partnerships and Programs
East Paces
Stephanie Foote
Associate Professor of Education
C. Jean So
Assistant Director, Office of Orientation and Transition Programs
Kennesaw State University
This session will describe how Kennesaw State University used self-study data from the Foundations of Excellence (FoE) – Transfer Focus to create unique partnerships and programs between student and academic affairs that respond specifically to the needs of transfer students. The presenters will share examples of the partnerships and academic and cocurricular programs developed. Participants will leave the session with resources and strategies they can use to ignite transfer student success at their institution.

CT-63 Scholarship Assistance Program: A Resource to Increase Students’ Financial Awareness
West Paces
Shakira Whitley
Sophomore Year Counselor
Andre Fontenelle
Assistant Director of Sophomore Year Programs
Long Island University-Brooklyn
As tuition rises, finding the right financial aid package becomes more challenging. Many students are unable to afford college. They are forced to pay out of pocket and leave without earning degrees. To help students succeed, Long Island University-Brooklyn established the Scholarship Assistance Program. This program supports students in researching, identifying, and applying for scholarships. Staff members devise individualized plans of action for each student. Through the process, students develop résumés, articulate career objectives, and create personal statements. Students who engage in the process have the opportunity to reduce their financial debt while developing a better understanding of themselves.

MONDAY, OCTOBER 21

MONDAY BREAK
10:45 am – 11:00 am
Grande Ballroom Foyer

11:00 am-12:00 noon

Please join the conference conversation on Twitter:  @NRCFYESIT #SIT13
The second year is a pivotal transition point for many college students—a time when they are attempting to find meaning in life, declare a major, and/or determine if they should remain in school. The purpose of this roundtable discussion is to identify the needs of second-year students, explore various programs that enhance sophomore success, and encourage participants to develop actions plans that will address the concerns of this population.

CT-65 Creating Partnerships That Stay in SYNC: A Look at a Sophomore Living-Learning Community and Its Partnership With Academic Advising
Tuxedo
Sarah Rowe
Community Director
Kimberlee Nelson
Academic Advisor
University of North Carolina at Chapel Hill
Following the safety net of the first-year experience, second-year students face unforeseen challenges. Sophomore slump looms on every college campus for many students. As professionals, we are charged with striking the balance between meeting student needs while providing room for growth and learning. This session will examine the Sophomore Year Navigating Carolina (SYNC) living-learning community at UNC-Chapel Hill. The presenters will focus on best practices for student engagement, student leadership, and professional involvement when supporting second-year students. Additionally, insights into effective academic collaborations will be shared.

CI-66 Easing the Transition to College Through Paired First-Year Seminars
Chastain
Denise Wilkinson
First-Year Experience Director
Rebecca Hooker
Assistant Professor of English
Virginia Wesleyan College
Three years ago, Virginia Wesleyan College pared their first-year seminar down from two credits to one credit and linked each section with a content course to enhance first-year student success. Additionally, the program’s emphasis changed from inquiry-based learning to the transition from high school to college. The presenters in this session will discuss the changes that were made in the redesigned first-year experience program and the rationale behind the changes. Additionally, they will share information on the format of the current course and program, examples of hands-on classroom activities, and course evaluation results.

CT-67 Brain-Based Learning and Multiple Generational Learning Styles in the Classroom
Grand C
Tonya Strickland
Associate Professor of Psychology
Bainbridge State College
With the possibility of four generations of students in the first-year experience (FYE) classroom, not only are learning styles important for effective instruction but generational learning styles also make a difference in how students communicate and connect with one another. Further, ever-evolving technology and the way it is changing how we process information can present additional challenges to the instructor who must be ready to use brain-compatible learning strategies to help all students in the classroom thrive. This session will provide a look at multigenerational learning styles and how they interfere or enhance a student’s experience in the FYE class. In addition, seven fundamental principles of brain-based learning will be explored.

R-68 Discussing What Works: Strategies for Senior-Year Experiences
Grand D
Thomas Cox
Assistant Professor, Higher Education and Policy Studies, College of Education and Human Performance
Marty Robinson
PhD Candidate
Rosa Cintron
Associate Professor and Program Coordinator, Higher Education and Policy Studies, College of Education and Human Performance
The University of Central Florida
This roundtable session is intended to provide an opportunity for institutions with senior-year success strategies and those without to discuss challenges, opportunities, learning, and feedback. Whether you are forming, storming, norming, or performing, come share with your colleagues how you are strategizing the senior-year experience and transition at your institution.

CT-69 If You Build It—They Will Come: Building a Bridge Between First-Year Students and Advising
Grand E
Sue Saunders
Director of Academic Advising and Learning Support Services
California State University-Channel Islands
Initial advising connections with first-year students often take place in a group format during summer orientation programs. A wealth of information is disseminated, and students can leave campus on information overload.
To best serve new, incoming students, California State University-Channel Islands adopted creative strategies that build on advising connections established during orientation and continue up to graduation. Participants will learn about the advising format used during orientation and a communication plan designed to strengthen advising. Through the first-year student STAR appointment, the first-year seminar, peer advising, collaboration with student affairs, and a proactive communication plan, first-year student visits to the University’s Advising Center have increased.

**CT-70 A Major Perspective on Retention: The Impact of Learning Communities on the First-Year Experience and Beyond**

Peachtree

**Constance Goodman**  
Instructor, Program Coordinator  
*University of Central Florida*

Impacting what happens in the first two years of college is essential for institutions interested in facilitating students’ degree completion. Yet, many first-year programs are championed by a single unit (e.g., campus office of student affairs) while academic units tend to become involved much later in a student’s college experience. This session will inform participants of effective components of the Supporting Teacher Education Pre-professionals (STEP) program, a living-learning community designed to connect students to their major and retain them to degree completion. Results demonstrated that early engagement with the field of teacher education through the STEP program positively affected the retention of prospective teachers in college. These findings can assist other academic units in designing similar programs or learning communities.

**Closing Town Meeting**

12:15 pm – 12:45 pm  
Grand Ballroom C

This concluding session is designed as an open discussion on ideas and information presented at this conference and current issues in the first-year experience. The staff of the National Resource Center for The First-Year Experience and Students in Transition will facilitate the session and encourage active participation. Of particular interest is what has been learned and where we need to go from here. Please join us.
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- How To Reduce Test Anxiety *
- Understanding & Avoiding Plagiarism
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- Exam Preparation Tips & Test-Taking Strategies

Online Learning
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- Effectively Communicating Online
- Online Courses: Staying Motivated & Disciplined
- Taking Tests Online: Strategies For Success

Reading & Writing Strategies
- Pre-Writing Techniques
- Developing A Strong Thesis Statement
- Introductions, Paragraphs & Conclusions
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- Building relationships with students
- Teaching with technology
- Assessing student learning
- Incorporating cooperative learning strategies
- Building a syllabus
- Classroom civility

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<thead>
<tr>
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April 4 - 6, 2014
University of South Carolina
Columbia, South Carolina

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Sunday | October 20, 2013  Conference Sessions

9:00 am – 10:00 am

Title of Session: ____________________________________________________________

Presenter Signature: ________________________________________________________

10:15 am – 11:15 am

Title of Session: ____________________________________________________________

Presenter Signature: ________________________________________________________

2:00 pm – 3:30 pm

Title of Session: ____________________________________________________________

Presenter Signature: ________________________________________________________

3:15 pm – 4:15 pm

Title of Session: ____________________________________________________________

Presenter Signature: ________________________________________________________

4:30 pm – 5:30 pm

Title of Session: ____________________________________________________________

Presenter Signature: ________________________________________________________

4:30 pm – 5:45 pm

Title of Session: ____________________________________________________________

Presenter Signature: ________________________________________________________

Continue to the next page
I certify that I have attended all of the above sessions at the 20th National Conference on Students in Transition in Atlanta, Georgia.

Participant Signature _______________________________________________  Date _________________________________

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How to integrate learner motivation planning into lesson planning:
The ARCS model approach

John Keller
Florida State University
U.S.A.

Running head: Integrating motivation

Introduction: Issues & Problems

Every educator knows the challenge of stimulating and sustaining learner motivation and the difficulty of finding reliable and valid methods for motivating learners. One approach to meeting this challenge is provided by the ARCS model of motivation (Keller, 1999a, b) which provides guidance for analyzing the motivational characteristics of a group of learners and designing motivational strategies based on this analysis. After giving an overview of the model, I will describe some recent developments including a simplified approach to applying it and how it may be incorporated into lesson planning.

Characteristics of the ARCS Model

The ARCS model is based on a synthesis of motivational concepts and characteristics into the four categories of attention (A), relevance (R), confidence (C), and satisfaction (S). These four categories represent sets of conditions that are necessary for a person to be fully motivated, and each of these four categories has component parts, or subcategories (Table 1), that represent specific aspects of motivation.

First, a lesson must gain the learner's attention. Tactics for this can range from simple unexpected events (e.g. a loud whistle, an upside-down word in a visual) to mentally stimulating problems that engage a deeper level of curiosity, especially when presented at the beginning of a lesson. Another element is variation, which is necessary to sustain attention. People like a certain amount of variety and they will lose interest if your teaching strategies, even the good ones, never change.

The second requirement is to build relevance. Even if curiosity is aroused, motivation is lost if the content has no perceived value to the learner. Relevance results from connecting the content of instruction to important goals of the learners, their past interests, and their learning styles. One traditional way to do this is to relate instructional content to the learners' future job or academic requirements. Another, and often more effective approach is to use simulations, analogies, case studies, and examples related to the students' immediate and current interests and experiences. For example, secondary school children enjoy reading stories with themes of stigma, popularity, and isolation because these are important issues at that time of their lives.

The third condition required for motivation is confidence. This is accomplished by helping students establish positive expectancies for success. Often students have low confidence because they have very little understanding of what is expected of them. By making the objectives clear and providing examples of acceptable achievements, it is easier to build confidence. Another aspect of confidence is how one attributes the causes of one's successes or failures. Being successful in one situation can improve one's overall confidence if the person attributes success to personal effort or ability. If the student believes that success was due to external factors such as luck, lack of challenge, or decisions of other people, then confidence in one's skills is not likely to increase.

If the learners are attentive, interested in the content, and moderately challenged, then they will be motivated to learn. But to sustain this motivation, the fourth condition of motivation is required -- satisfaction. It refers to positive feelings about one's accomplishments and learning experiences. It means that students receive recognition and evidence of success that support their intrinsic feelings of satisfaction and they believe they have been treated fairly. Tangible extrinsic rewards can also produce satisfaction, and they can be either
substantive or symbolic. That is, they can consist of grades, privileges, promotions or such things as certificates, monogrammed school supplies, or other tokens of achievement. Opportunities to apply what one has learned coupled with personal recognition support intrinsic feelings of satisfaction. Finally, a sense of equity, or fairness, is important. Students must feel that the amount of work required by the course was appropriate, that there was internal consistency between objectives, content, and tests, and that there was no favoritism in grading.

These four categories provide a basis for aggregating the various concepts, theories, strategies, and tactics that pertain to the motivation to learn (Keller, J. M., 1987a). They represent the first major part of the ARCS model, which is the synthesis of the vast motivational literature into a simple and useful number of macro-level concepts. They also provide the basis for the second major feature of the ARCS model which is the systematic design process that assists you in creating motivational tactics that match student characteristics and needs (Keller, 1987b).

The ARCS model contains a ten-step design process for the development of motivational systems in work and learning settings (Figure 1). The first two steps, which are parts of the overall analysis components of the process, produce information about the status quo and provide the basis for analyzing gaps and their causes which are done in the third and fourth steps. Based on these analyses, in Step 5 one prepares objectives for the performance improvement project and specifies how they will be assessed. There are then two steps in design. Step 6 consists of brainstorming within each motivational category to generate a rich list of potential solutions. Step 7 is more critical and analytical for the purpose of selecting solutions that best fit the time, resource, and other constraining factors in the situation. The final step includes both development and evaluation, and is similar to any other development model.

Analysis. As in any systematic design process, motivational system development begins with collecting information (Steps 1 and 2) and analyzing it (Steps 3 and 4) to identify motivational characteristics and gaps which lead to objectives (Step 5). In this process, there are two difficulties in determining the degree and nature of a motivational problem. First is that problems resulting in symptoms of demotivation may not be due to motivational causes. People can become demotivated as a consequence of what is, in fact, a capability or opportunity problem. For example, people who do not have and cannot get the skills required to perform satisfactorily will soon learn that they cannot succeed to a satisfactory degree. They will develop low expectations for success, or even feelings of helplessness, and will be demotivated as evidenced by lowered levels of effort and performance. However, the cause of the problem in this example is lack of skills.
Table 1. Modified subcategories of the ARCS model

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<td><em>How can I stimulate an attitude of inquiry?</em></td>
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<td><em>How can I use a variety of tactics to maintain their attention?</em></td>
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<td>Match Interests (Motive Matching):</td>
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<td><em>How and when can I provide my learners with appropriate choices, responsibilities, and influences?</em></td>
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<td>Tie to Experiences (Familiarity):</td>
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<td><em>How can I tie the instruction to the learners’ experiences?</em></td>
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<td><em>How can I assist in building a positive expectation for success?</em></td>
</tr>
<tr>
<td>Success Opportunities (Learning Activities):</td>
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<tr>
<td><em>How will the learning experience support or enhance the students’ beliefs in their competence?</em></td>
</tr>
<tr>
<td>Personal Responsibility (Success Attributions):</td>
</tr>
<tr>
<td><em>How will the learners clearly know their success is based upon their efforts and abilities?</em></td>
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<table>
<thead>
<tr>
<th>Satisfaction</th>
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<tr>
<td>Intrinsic Satisfaction (Self-Reinforcement):</td>
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<tr>
<td><em>How can I provide meaningful opportunities for learners to use their newly acquired knowledge/skill?</em></td>
</tr>
<tr>
<td>Rewarding Outcomes (Extrinsic Rewards):</td>
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<tr>
<td><em>What will provide reinforcement to the learners’ successes?</em></td>
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<tr>
<td>Fair Treatment (Equity):</td>
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<tr>
<td><em>How can I assist the students in anchoring a positive feeling about their accomplishments?</em></td>
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</table>
The second difficulty in identifying a motivational problem lies in the nature of motivation. Motivation follows a curvilinear relationship with performance (Figure 2). As motivation increases, performance increases, but only to an optimal point. Afterward, performance decreases as motivation increases to levels where excessive stress leads to performance decrements. There is always some level of tension, or stress, associated with motivation. On the rising side of the curve it is sometimes referred to as facilitative stress and on the downside as debilitating stress.

Given that there is a motivational problem, one then classifies it according to the four categories described earlier and determines whether the learners or employees are under- or over-motivated in each case. For example, in the case of attention, people might be demotivated because they are bored and not paying attention to the task, or because they are so over-stimulated by the job opportunity or requirements that they are trying to pay attention to too many things at once. In both cases they do not focus their attention on the critical task, but solutions differ depending on whether the cause is under- or over-stimulation. Comparable problems occur in the other categories of motivation and require tactics to modify learner motivation into a more productive range.

In conducting motivational analysis, it is important to identify the nature of motivational gaps in these terms, and to realize that the problems might be different in one subgroup or individual than in another. It is also important to identify the presence of any positive motivational factors. A motivational system has to be capable of solving motivational problems, but it also has to sustain desirable levels of motivation. The output of analysis indicates where there are motivational gaps to be closed and where satisfactory levels of motivation need to be sustained rather than changed. Figure 2, for example, illustrates that the class under analysis has learners with widely varying levels of confidence, that there are two aspects of relevance of which one is too high and one is too low, and that the levels of attention and satisfaction are about right. The two levels of relevance probably result from the class being required which makes it necessary for success, but not being perceived by the learners has having any personal value. The results of this analysis provide guidance in selecting and generating motivational tactics.

**Design.** In motivational design (Figure 1, Steps 6 - 8), it is best to work on specifically defined problems. This needs to be stated because it can be more of a problem in motivational design than in some other performance areas. Often, people will try to deal with the global issue of how to improve motivation by adopting a global solution, such as a new set of curriculum materials or an entirely new approach to teaching. This approach may be successful for awhile, but after the novelty wears off, the old motivational problems tend to re-emerge.

After choosing a specific problem to solve, the primary task in the first design step (Step 6) is to brainstorm possible solutions. At this point, all potential solutions should be listed without regard to their presumed feasibility. The goal, as in any brainstorming process, is to produce as many ideas as possible.

The second task (Step 7) is to define the ideal solution without regard to constraints. The ideal solution might be constructed from several of the specific suggestions that were made during the brainstorming process, or it might emerge as a new idea from the stimulation provided by brainstorming. An important element at this point is to not worry about expense, organizational policies, or other constraints that might inhibit the discovery of an ideal solution.
Figure 1. Motivational design: Ten step model

1. Obtain course information
   - Course description and rationale
   - Setting and delivery system
   - Instructor information

2. Obtain audience information
   - Entry skill levels
   - Attitudes toward school or work
   - Attitudes toward course

3. Analyze audience
   - Motivational profile
   - Root causes
   - Modifiable influences

4. Analyze existing materials
   - Positive features
   - Deficiencies or problems
   - Related issues

5. List objectives & assessments
   - Motivational design goals
   - Learner behaviors
   - Confirmation methods

6. List potential tactics
   - Brainstorm list of tactics
   - Beginning, during, and end
   - Throughout

7. Select & design tactics
   - Integrated tactics
   - Enhancement tactics
   - Sustaining tactics

8. Integrate with instruction
   - Combine designs
   - Points of inclusion
   - Revisions to be made

9. Select & develop materials
   - Select available materials
   - Modify to the situation
   - Develop new materials

10. Evaluate & revise
    - Obtain student reactions
    - Determine satisfaction level
    - Revise if necessary
Then, in Step 8, one selects the most feasible tactics listed in Step 7 and integrates them into a motivational system. The reason for making this a multi-step process is that Step 6 encourages one to envision, without restraint, all potential solutions, including those that might initially seem to be too grandiose or “ideal.” By so doing, one is more likely to approximate an ideal than if one had narrowly focused from the beginning on the first possible solution. In Step 7 of the process, one creates the best possible solutions by combining ideas from step 6 and by applying several selection criteria pertaining to expense, policy, acceptability, and proportionality (the motivational activities should support the learning goals, not distract from them).

Development and evaluation of the solutions, which occurs in Steps 9 and 10, follow the same process that one would employ for any other area of application. The first activity is to prepare a plan of work for writing, media development, developmental reviews, and preparations for implementation. As with any effective system development activity, it is important to have motivational tactics and strategies well integrated with other system components. For example, tactics such as case studies at the beginning of a lesson can be a total waste of time if they do not meet specific needs of the audience and help prepare them for the topics and objectives of the course. Audience evaluation provides the means for determining the effectiveness of the tactics.

This design process is comprehensive and effective, but it has two limitations. First is that it requires that the motivational designer or teacher have quite a bit of knowledge of the different motivational factors represented by the four categories and all the subcategories. Second, it can be time consuming to implement all the steps. In situations where there are serious motivational challenges, or when it is highly critical to maximize the motivational effectiveness of a lesson or course, then the full ten-step process can be the best approach to follow. But, in many situations these conditions are not met. With teachers or instructional designers who have little or no formal knowledge of motivational concepts and principles, or in settings where a quick approach can result in adequate improvements, it would be good to have a simpler model.

Figure 2: Curvilinear diagram for audience analysis
A Simplified Approach

A recent development in Japan (Suzuki and Keller, 1996; Keller, 1997) provides a simplified and effective approach to motivational design, and it has subsequently been applied in two innovative applications to the improvement of self-directed learning. The first was in the development of motivationally adaptive computer-based instruction (Song, 1998). In addition to incorporating the simplified motivational design approach, it builds on concepts and approaches initiated in the United Kingdom and Italy by del Soldato and du Boulay (1995) and in Austria (Astleitner and Keller, 1995). The prototype of the adaptive CBI was developed in the USA, and it will be cross-validated in Korea. The second application was in the student support methods for a distance learning course in Europe (Visser, L., 1998). It is interesting to note the multinational representation in these studies.

In Sendai, Japan, a team of 25 teachers in 8 subject areas at Sendai Daichi Junior High School had been developing computer application projects for several years as part of a demonstration project sponsored by the Japanese national government. During the last two years of the project, they were asked to incorporate systematic motivational design into their process. Suzuki (Suzuki and Keller, 1996) developed a simplified approach to motivational design because the full, seven-step model would require too much time for training and implementation. The goal of the simplified approach was to ensure that the teachers would identify key motivational characteristics in the learners, the content area to be taught, and the hardware or software to be used. The teachers then evaluated this information and prescribed tactics based on identified motivational problems. This process helped ensure that teachers avoided the inclusion of excessive numbers of tactics, or tactics derived from their own preferred areas of interest without regard to the characteristics of the students and the situation.

The resulting design process is represented in a matrix (Table 2). In the first row, the designer lists salient characteristics of the learners’ overall motivation to learn. The second row contains the designer’s judgements about how appealing the learning task will be to the learners. The third and fourth rows ask about learners’ expected attitudes toward the medium of instruction and the instructional materials. Each of the entries in these rows has a “plus” or “minus” sign to indicate whether it is a positive or negative motivational characteristic. Based on the information in these first three rows, the motivational designers decide how much motivational support is required and what types of tactics to use. They refer to reference lists of potential tactics (for example Keller and Burkman, 1992; Keller and Suzuki, 1988) and also create their own based on the identified needs.

In this example, the teacher determined that confidence is the only real problem area, and he listed some specific things to deal with it. He also listed some specific tactics for the other categories, but they serve to maintain motivation instead of solving a specific problem.

A benefit of his application of this process was that in his initial motivational plan, before he applied this process, he had a much longer list of tactics that he thought would be exciting and motivational. After doing the analysis and applying various selection criteria that are listed in the training materials on motivational design, he realized that his list of tactics would be too time consuming, and would actually distract from the students’ intrinsic interest in the subject as revealed in his analysis. By using the design process, he was able to simplify the motivational design and target it to specific needs.
Table 2. ARCS simplified design matrix: Elective unit on using international e-mail

<table>
<thead>
<tr>
<th>DESIGN FACTORS</th>
<th>ARCS CATEGORIES</th>
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<tbody>
<tr>
<td></td>
<td>Attention</td>
</tr>
<tr>
<td>LEARNER CHARACTERISTICS</td>
<td>Elective course, High interest (+)</td>
</tr>
<tr>
<td>LEARNING TASK (Learners’ attitudes toward)</td>
<td>New, attractive, adventurous (+)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIUM: Computer in this lesson (Learners’ attitudes toward)</td>
<td>Interesting new use as a networking tool (+)</td>
</tr>
<tr>
<td>COURSEWARE CHARACTERISTICS (E-mail software)</td>
<td></td>
</tr>
<tr>
<td>MOTIVATIONAL TACTICS FOR THE LESSON</td>
<td>Minimal tactics required:</td>
</tr>
<tr>
<td></td>
<td>-Emphasize opportunity to communicate worldwide</td>
</tr>
<tr>
<td></td>
<td>-Demonstrate immediate transmission and response features</td>
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</table>

An evaluation of the effectiveness of this motivational design process (Suzuki and Keller, 1996) verified that the teachers were able to use the matrix accurately with only a few entries not being placed appropriately, and more than two-thirds felt that it definitely helped them produce a more effective motivational design. Some teachers had difficulties with the analysis phase, which indicates that this is a critical area to address in training people to use the process.

This simplified design process was modified and used in two subsequent projects. The first of these was to develop a prototype of motivationally adaptive computer-based instruction. The
formal motivational design process requires an audience analysis which influences which motivational tactics are included in the learning environment. However, learner motivation changes over time, and in sometimes unpredictable ways. In a classroom or other instructor-led setting, an expert instructor can continuously gauge the audience’s motivational condition and make adjustments as appropriate. But in self-directed learning environments, this type of continuous adjustment has not been a feature. Once the instruction has been designed and “packaged,” everyone receives the same program, with the exception of limited branching and other learner control options. These options can have a positive effect on motivation, but they do not adequately reflect the range of motivational conditions that characterize learners at different points in time.

It would be possible to include a large number of motivational tactics to cover a broad range of motivational conditions, but this would most likely have a negative effect on motivation and performance. The reason is that when students are motivated to learn, they want to work on highly task-relevant activities. They do not want to be distracted with unnecessary motivational activities. For this reason, it would be nice to have computer or multi-media software that can sense a learner’s motivation level and respond adaptively.

**Integration into Lesson Planning**

However, there has still been a gap in the model with respect to providing guidance for integrating the motivational tactics into a teacher’s actual lesson plan. This presentation helps to close this gap by illustrating how motivational strategies and tactics can be incorporated along side an outline of lesson content and instructional activities (Appendix A).

The header of the lesson plan has a place to make notes about the overall sustaining strategy and enhancement strategy for the lesson. The distinction between sustaining and enhancement strategies refers to the degree to which the learners will be motivated by the lesson. If their overall motivation is high, then all that is required of the teacher or designer is to sustain the learners’ motivation by using variety in teaching approaches, continuing to use relevant examples, and providing appropriate types of motivating feedback. But, if you suspect that there will be specific motivational challenges, or deficiencies, then it is necessary to plan a motivational approach that will overcome these problems. In the example in Appendix A, fifth and sixth grade students will be engaged in a year-long independent research project. There will be relatively long intervals between class sessions devoted to this project. Therefore, many learners can be expected to have serious problems with relevance and confidence during the year. That is, the learners will have trouble sustaining interest in a project that does not have immediate assignments and feedback, they may have doubts from time to time as to how important the project really is, and they may doubt that they can really do all the work that will be required. Therefore, the teacher has to include an overall strategy, with appropriate tactics, that will counteract these motivational obstacles.

The body of the lesson plan has columns that are fairly typical, even the formats of lesson plans vary. This lesson plan has a unique feature in that it includes a column devoted specifically to motivational planning. It allows one to implement the results of the analysis and design steps in the ARCS planning process (Figure 1, Steps 1 – 7)) by integrating it into the content and instructional strategies of the lesson (Figure 1, Step 8).
Benefits of this type of lesson plan are that it allows one to

- “See” the overall architecture of the lesson
- Check the lesson for balance of content and activities
- Easily check to see if there is variation in approach (that is, that the same pattern of instructional or motivational techniques are not used over and over again)
- Critically review the contents, instructional tactics, and motivational tactics in terms of internal consistency and fidelity to the lesson and course objectives, and
- Obtain reviews and feedback from other people who can easily review the structure and content of the lesson.

Summary

There has never been any doubt about the importance of learner motivation, but there have been difficulties obtaining methods and approaches for systematically predicting and influencing motivation. Traditionally we have relied on compilations of personal experiences by successful teachers and listings of results from academic studies. The ARCS model resulted from reviews and integration of research literature and successful practices. It has been validated in numerous research studies (for example, Means, Jonassen, & Dwyer, 1997; Small & Gluck, 1994; and Visser & Keller, 1990) and it is being used in many different countries and cultures in the world. However, it does not offer simple, prescriptive solutions to motivational problems. It offers problem solving approach that leads one to solutions appropriate for a given situation. Furthermore, it is an evolving model. Just as this paper introduces the lesson planning template for the first time, there are many areas of research and development to be undertaken that will continue to help this model be more effective or lead to the development of alternative approaches. The goal of the model, like the goal of many educators, is to assist in helping learners want to learn and develop in ways that helps them build satisfying lives that contribute something positive to their world.
References


## Appendix A: Detailed Lesson Guide

### 1. Course Title: English (5th & 6th grade special project)

### 2. Module Title: Independent Project Development

**Module Objective:** Plan, conduct, and report the results of an independent research project.

### 3. Lesson Title: 1. Identifying a research topic and goal.

**Lesson Terminal Learning Objective (TLO):** Learners will obtain background information in their areas of interest and define their topic and objective.

**NOTE:** This is the first of three lessons pertaining to this independent project. Each lesson covers several class meetings spread at intervals during the year-long project.

### 4. Lesson Motivational Strategy Overview

#### a. Sustaining strategy:
The overall assignment will be motivating, but it will be necessary to use a variety of approaches to sustain interest and high levels of sharing results to keep them interested and productive.

#### b. Enhancement strategy:
They will have trouble seeing the relevance of this assignment at some points, and their confidence will waver during the extended time required to complete all parts of the project. Therefore, the overall enhancement strategy is to (1) organize assignments on an increasing level of difficulty from knowledge and comprehension at the beginning to synthesis and evaluation at the end, (2) provide encouragement at points in the process that you know to be challenging or discouraging, (3) provide timely, positive feedback at every interval that an assignment is completed.

### 5. Primary Delivery System:
Classroom meetings from time to time combined with email or snail mail to sustain interest and progress.

### 6. Sequenced Intermediate Learning Objectives (ILOs) and TLOs

### 7. Content Outline

1.1 Identify a general area of interest

- Purpose and approach of the independent research project.
- Examples of topics from past classes.
- Things to consider in selecting a topic of interest.
- Things to consider in selecting a partner or working independently on this project.

### 8. Instructional Tactics (Activities, Self-Checks, Tests)

- Ask a series of questions about how people obtain information about things they are interested in.
- Explain the project to them.
- Give examples of topics chosen by learners in previous classes.
- Then ask how they would go about identifying an area that they want to know more about.
- Allow them to select a partner if they wish. They can change their decisions at a later time.

### 9. Motivational Tactics (Activities)

- Use examples from everyday life, such as news reporters, authors, and people who want to know more about cars, home construction, or anything else. (A,R)
- Compare independent research to activities such as exploring and other types of adventures. (A)
- Shift interaction from student-teacher to student-student by permitting learners to work as partners on the project. (A,C)

### 10. Materials

- OHP of previous topics.

### 11. Time Rqd.

- Class 1: 20 min

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<tr>
<td>1.2 Gather background information in the area of interest.</td>
<td>Sources of information that are readily available to these learners. Guidelines on how to gather material. How much and what kinds of things they are to gather for this assignment.</td>
<td>Explain the guidelines for gathering information. Explain what kinds of materials they must gather before making their final topic selection.</td>
<td>Ask what they do when they want to know more about something, even something like a new game or toy. (A)</td>
<td>OHP: Gathering information Handout: Gathering information</td>
<td>Class 1: 30 min</td>
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<tr>
<td>1.3 Prepare a topic description.</td>
<td>Characteristics and elements of a topic description. Examples from a variety of different topic areas.</td>
<td>Explain what goes into a good topic statement. Present the examples. Have learners practice writing some descriptions. Have some of the individuals or groups share theirs with the rest of the class. Give feedback.</td>
<td>Show examples of previous projects (A, C) Permit learners to choose any topic they wish (A, R) and develop it in any medium they wish. (C) Ask learners to relate the assignment to their future goals. (R)</td>
<td>Examples of previous projects. Handout: Requirements for a good goal statement</td>
<td>Class 2: 20 min</td>
</tr>
<tr>
<td>1.4 Prepare a research plan.</td>
<td>The elements of a good research plan including activities, methods, and deadlines.</td>
<td>Present the elements of a research plan. Ask how this is similar to the gathering information they already did (it’s the same except more formal and focused). Ask them to prepare drafts of their research plans, which they will finish as homework.</td>
<td>Provide meaningful alternative methods for accomplishing their goals: Let each small group brainstorm various methods they could use to approach their study and project. (R).</td>
<td>Handout: Guidelines for, and example, of, a research plan</td>
<td>Class 2: 30 min</td>
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<tr>
<td>1.5 Accept individual responsibility for independent learning decisions and deadlines while working cooperatively with one or more partners.</td>
<td>How to plan for success, including such things as setting and keeping deadlines, anticipating obstacles and overcoming them, and communicating with your partner.</td>
<td>Ask the learners why they sometimes don’t finish what they start, or they don’t get things done on time. List the answers on the board. Ask them if they can think of things that will make this assignment more difficult to do on time than normal classroom assignments and homework. List the answers on the board. Have learners review their research plans to see if they want to modify deadlines and responsibilities to be more realistic.</td>
<td>Explain what experience and research has shown that makes it difficult to stay on schedule and finish this kind of independent work. (C) Help learners set challenging but realistic goals by reviewing their plans and providing detailed feedback. (C) Provide self-evaluation tools that they will use at designated intervals in the project. (C)</td>
<td>Handouts: Self-evaluation tools.</td>
<td>Class 3: 20 min</td>
</tr>
<tr>
<td>1.6 Use varied forms of expression and media to communicate ideas.</td>
<td>How to prepare both written and oral reports of their topics and research plans.</td>
<td>Present guidelines for how to prepare and present their topic descriptions and research plans to the rest of the class. Provide examples. Review written reports and presentation outlines before they do their presentations.</td>
<td>Give detailed attention to each student/group at intervals during the project. (S) Give meaningful positive feedback every time an individual or group does something good, and give corrective, not critical feedback to help them improve. (S, C) When doing these presentations, let the groups share any “tips for success” that they have come up with, and that might help everyone as they go into the next phase of the project. (S)</td>
<td></td>
<td>Class 3: 30 min (for planning) Class 4: 50 min (for presentations)</td>
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Studies Show that We Learn:

- 10% of what we READ
- 20% of what we HEAR
- 30% of what we SEE
- 70% of what is DISCUSSED with others
- 80% of what we EXPERIENCE personally
- 90% of what we TEACH

1. **Carousel Brainstorming**: Post charts on the wall with key questions or ideas at the top. Groups are formed and one person scribes for the group and adds to the chart as they brainstorm. Groups move to a new chart, read other groups’ responses and then add to the chart. Teams may use a different color of felt pen.

2. **Card Sort**: Students or teacher can prepare cards with terms on one colour and definitions on the other. Students work in teams to find matches.

3. **Circle the Sage**: The teacher polls the class to see which students have special knowledge to share on a topic. Those students become the sages stand and spread out in the room. The teacher divides the remaining students evenly into teams and teams send members to different sages, (so no two members of the same team going to the same sage). The sage explains what they know while the classmates listen, ask questions, and take notes. All students then return to their teams. Each in turn, explains what they learned from their sage.

4. **Four Corners**: Teacher poses a question and gives four potential responses and points to a corner for each one. Students decide which they agree with or would like to discuss move to that corner. They discuss the topic with those who also move to that corner.

5. **Gallery Walk**: After teams have generated ideas on a topic using a piece of chart paper, they appoint a “docent” to stay with their work. Teams rotate around examining other team’s ideas and ask questions of the docent. Teams then meet together to discuss and add to their information so the docent also can learn from other teams.

6. **Graffiti –** Groups receive a large piece of paper and felt pens of different colors. Students generate ideas in the form of graffiti. Groups can move to other papers and discuss/add to the ideas.

7. **Human Continuum**: Teacher poses a question or problem and students line up according to their opinion on the answer.

8. **Jigsaw**: “Home groups” with a small number students are formed. Each group member is assigned a number. Students move to an “expert group” containing others who have the same number. They work on the same sub-section get together to decide what is important and how to teach it. After practice in these “experts” return to the home group and each expert teaches their section of material.
9. **Inside/Outside Circle:** Divide class in half. One group forms a circle facing outward, the others find one person in the circle to stand opposite, so there are two circles of people facing each other. Information can be shared and reviewed, and outer circle can move easily to generate more responses or discuss new information.

10. **Number Heads Together:** Students sit in groups and each group member is given a number. The teacher poses a problem and all four students discuss. The teacher calls a number and that student is responsible for sharing for the group.

11. **Pass a Problem:** Teacher creates problems for teams to solve and writes or attaches them to envelopes. Teams read the problems, place their solutions in the envelope and then exchange with another team to check their solution and to determine if they solved the problem in a different way.

12. **Round Robin Brainstorming:** Class is divided into small groups with one person appointed as the recorder. An open-ended question is posed and students are given time to think about answers individually. Next, members of the team share responses with one another, round robin style. The recorder writes down the answers of the group members.

13. **Say and Switch:** Partners take turns responding to topics at signalled times. The times will be unpredictable and the person listening must pick up from their partner’s train of thought before adding new ideas.

14. **Send a Problem:** Students write a review problem on a card and ask teammates to solve their problem. Teammates solve and the question-writer determines if they have come up with a good solution. Other team members repeat the process.

15. **Talking Chips:** Each student is given a certain number of chips. Each time they talk they must submit a chip, but once their chips are gone they may no longer talk. Students must use all their chips.

16. **Team-Pair-Solo:** Students do problems first as a team, then with a partner, and finally on their own. By allowing them to work on problems they could not do alone, first as a team and then with a partner, they progress to a point they can do alone that which at first they could do only with help.

17. **ThinkPad Brainstorming:** Requires students to individually brainstorm and write down their answers on a sheet of paper. Once they are all done they are to share their information with a partner or team.

18. **Three-minute Pause:** Teachers stop any time during a lecture or discussion and give teams three minutes to review what has been said, and to ask clarifying questions.

19. **Three Stay, One Stray:** In a group of four (or could be more), students solve a problem. While they work, they send one member to “stray” to another group to compare teams’ solutions.
20. **Three-Step Interview**: Partners interview each other then share what they have learned with another team of two.

21. **Think-Pair-Share**: First, individuals think silently about a question posed by the teacher. Individuals pair up and exchange thoughts. Finally, the pairs share their responses with the whole class.

22. **Think-Pair-Square**: The same process as think-pair-share, except that partners share with another set of partners before the whole-class discussion.

23. **Two Facts and a Fib**: Students or the teacher write down two facts and one fib, the job of the team is to identify which is which.

24. **Visible Quiz**: Teacher poses questions with multiple choices responses and students sit in teams and discuss the responses. When the teacher asks, they hold up their answers and may be called on to explain their team’s reasoning.
Collaborative Learning and the "Conversation of Mankind"

Kenneth A. Bruffee


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*College English* is currently published by National Council of Teachers of English.
Collaborative Learning and the
"Conversation of Mankind"

There are some signs these days that collaborative learning is of increasing interest to English teachers. Composition teachers seem to be exploring the concept actively. Two years ago the term appeared for the first time in the list of topics suggested by the Executive Committee of the Conference on College Composition and Communication for discussion at the CCCC annual convention. It was eighth or ninth on a list of ten items. Last year it appeared again, first on the list.

Teachers of literature have also begun to talk about collaborative learning, although not always by that name. It is viewed as a way of engaging students more deeply with the text and also as an aspect of professors’ engagement with the professional community. At its 1978 convention the Modern Language Association scheduled a multi-session forum entitled "Presence, Knowledge, and Authority in the Teaching of Literature." One of the associated sessions, called "Negotiations of Literary Knowledge," included a discussion of the authority and structure (including the collaborative classroom structure) of "interpretive communities." At the 1983 MLA convention collaborative practices in re-establishing authority and value in literary studies were examined under such rubrics as "Talking to the Academic Community: Conferences as Institutions" and "How Books 11 and 12 of Paradise Lost Got to be Valuable" (changes in interpretive attitudes in the community of Miltonists).

In both these contexts collaborative learning is discussed sometimes as a process that constitutes fields or disciplines of study and sometimes as a pedagogical tool that "works" in teaching composition and literature. The former discussion, often highly theoretical, usually manages to keep at bay the more

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635
troublesome and problematic aspects of collaborative learning. The discussion of classroom practice is less fortunate. What emerges there is that many teachers are unsure about how to use collaborative learning and about when and where, appropriately, it should be used. Many are concerned also that when they try to use collaborative learning in what seem to be effective and appropriate ways, it sometimes quite simply fails.

I sympathize with these experiences. Much the same thing has happened to me. Sometimes collaborative learning works beyond my highest expectations. Sometimes it doesn’t work at all. Recently, though, I think I have been more successful. The reason for that increased success seems to be that I know a little more now than I did in the past about the complex ideas that lie behind collaborative learning. This essay is frankly an attempt to encourage other teachers to try collaborative learning and to help them use collaborative learning appropriately and effectively. But it offers no recipes. It is written instead on the assumption that understanding both the history and the complex ideas that underlie collaborative learning can improve its practice and demonstrate its educational value.

The history of collaborative learning as I know it can be briefly sketched. Collaborative learning began to interest American college teachers widely only in the 1980s, but the term was coined and the basic idea first developed in the 1950s and 1960s by a group of British secondary school teachers and by a biologist studying British post-graduate education—specifically, medical education. I myself first encountered the term and some of the ideas implicit in it in Edwin Mason’s still interesting but now somewhat dated polemic entitled Collaborative Learning (London: Ward Lock Educational Co., 1970), and in Charity James’ Young Lives at Stake: A Reappraisal of Secondary Schools (London: Collins, 1968). Mason, James, and Leslie Smith, colleagues at Goldsmith’s College, University of London, were committed during the Vietnam era to democratizing education and to eliminating from education what were perceived then as socially destructive authoritarian social forms. Collaborative learning as they thought of it emerged from this largely political, topical effort.

The collaborative forms that Mason and his colleagues proposed to establish in education had already been explored and their educational value affirmed, however, by the earlier findings of M. L. J. Abercrombie. Abercrombie’s Anatomy of Judgment (Harmondsworth: Penguin, 1964) culminated ten years of research on the selection and training of medical students at University College, University of London. The result of her research was to suggest that diagnosis, the art of medical judgment and the key element in successful medical practice, is better learned in small groups of students arriving at diagnoses collaboratively than it is learned by students working individually. Abercrombie began her study by observing the scene that lay people think is most typical of medical education: the group of medical students with a teaching physician gathered around a ward bed to diagnose a patient. She then made a seemingly slight but in outcome enormously important change in the way that scene is usually played out. Instead of asking each individual member of the group of students to diagnose
the patient on his or her own, Abercrombie asked the whole group to examine
the patient together, discuss the case as a group, and arrive at a consensus, a
single diagnosis that they could all agree to. What she found was that students
learning diagnosis this way acquired good medical judgment faster than individu-
als working alone (p. 19).

For American college teachers the roots of collaborative learning lie neither in
radical politics nor in research. They lie in the nearly desperate response of har-
ried colleges during the early 1970s to a pressing educational need. A decade
ago, faculty and administrators in institutions throughout the country became
aware that, increasingly, students entering college had difficulty doing as well in
academic studies as their native ability suggested they should be able to do. Of
course, some of these students were poorly prepared academically. Many more
of them, however, had on paper excellent secondary preparation. The common
denominator among both the poorly prepared and the seemingly well-prepared
was that, for cultural reasons we may not yet fully understand, all these students
seemed to have difficulty adapting to the traditional or "normal" conventions of
the college classroom.

One symptom of the difficulty these students had adapting to college life and
work was that many refused help when it was offered. The help colleges offered,
in the main, were tutoring and counseling programs staffed by graduate students
and other professionals. These programs failed because undergraduates refused
to use them. Many solutions to this problem were suggested and tried, from
mandated programs that forced students to accept help they evidently did not
want, to sink-or-swim programs that assumed that students who needed help but
didn't seek it out didn't belong in college anyway. One idea that seemed at the
time among the most exotic and unlikely (that is, in the jargon of the 60s, among
the most "radical") turned out in the event to work rather well. Taking hints
about the social organization of learning given by John Bremer, Michael von
Moschzisker, and others writing at that time about changes in primary and sec-
ondary education, some college faculty members guessed that students were re-
fusing help because the kind of help provided seemed merely an extension of the
work, the expectations, and above all the social structure of traditional class-
room learning (The School Without Walls [New York: Holt, 1971], p. 7). It was
traditional classroom learning that seemed to have left these students un-
prepared in the first place. What they needed, it seemed, was help that was not
an extension of but an alternative to traditional classroom teaching.

To provide that alternative some colleges turned to peer tutoring. Through
peer tutoring teachers could reach students by organizing them to teach each
other. And peer tutoring, it turned out, was just one way of doing that, although
perhaps the most readily institutionalized way. Collectively, peer tutoring and
similar modes such as peer criticism and classroom group work could be sensi-
bly classified under the convenient term provided by our colleagues in Britain:
collaborative learning. What the term meant in practice was a form of indirect
teaching in which the teacher sets the problem and organizes students to work it
out collaboratively. For example, in one type of collaborative learning, peer crit-
icism (also called peer evaluation), students learn to describe the organizational
structure of a peer's paper, paraphrase it, and comment both on what seems well done and what the author might do to improve the work. The teacher then evaluates both the essay and the critical response. In another type of collaborative learning, classroom group work, students in small groups work toward a consensus in response to a task set by the teacher, for example, a question about a play, a poem, or another student's paper. What distinguished collaborative learning in each of its several types from traditional classroom practice was that it did not seem to change what people learned (a supposition that now seems questionable) so much as it changed the social context in which they learned it. Students' work tended to improve when they got help from peers; peers offering help, furthermore, learned from the students they helped and from the activity of helping itself. Collaborative learning, it seemed, harnessed the powerful educative force of peer influence that had been—and largely still is—ignored and hence wasted by traditional forms of education.  

More recently, those of us actively interested in collaborative learning have begun to think further about this practical experience. Recent developments in philosophy seem to suggest a conceptual rationale for collaborative learning that yields some unexpected insights into pedagogical practice. A new conception of the nature of knowledge provides direction that we lacked earlier as we muddled through, trying to solve practical problems in practical ways. The better we understand this conceptional rationale, it seems, the more effective our practice of collaborative learning becomes.

In the hope that this experience will prove true for others, the following three sections outline the rationale of collaborative learning as I currently understand it and the relation of that rationale to classroom practice. The final section outlines some as yet not fully worked out implications both of collaborative learning as a practice and of some aspects of its conceptual rationale. Practice and rationale together, I will argue there, have the potential to challenge fairly deeply the theory and practice of traditional classroom teaching.

Conversation and the Nature of Thought and Knowledge

In an important essay on the place of literature in education published some twenty years ago, "The Voice of Poetry in the Conversation of Mankind," Michael Oakeshott argues that what distinguishes human beings from other animals is our ability to participate in unending conversation. "As civilized human beings," Oakeshott writes,

we are the inheritors, neither of an inquiry about ourselves and the world, nor of an accumulating body of information, but of a conversation, begun in the primeval forests and extended and made more articulate in the course of centuries. It is a conversation which goes on both in public and within each of ourselves. . . . Education, properly speaking, is an initiation into the skill and partnership of this conversation in which we learn to recognize the voices, to distinguish the proper occasions of utterance, and in which we acquire the intellectual and moral habits

appropriate to conversation. And it is this conversation which, in the end, gives place and character to every human activity and utterance. (*Rationalism in Politics* [New York: Basic Books, 1962], p. 199)

Oakeshott argues that the human conversation takes place within us as well as among us, and that conversation as it takes place within us is what we call reflective thought. In making this argument he assumes that conversation and reflective thought are related in two ways: causally and functionally. That is, Oakeshott assumes what the work of Lev Vygotsky and others has shown, that reflective thought is public or social conversation internalized (see, for example, Vygotsky, *Mind and Society* [Cambridge, Mass.: Harvard University Press, 1978]). We first experience and learn “the skill and partnership of conversation” in the external arena of direct social exchange with other people. Only then do we learn to displace that “skill and partnership” by playing silently ourselves, in imagination, the parts of all the participants in the conversation. As Clifford Geertz has put it,

thinking as an overt, public act, involving the purposeful manipulation of objective materials, is probably fundamental to human beings; and thinking as a covert, private act, and without recourse to such materials [is] a derived, though not useless, capability. . . . Human thought is consumately social: social in its origins, social in its functions, social in its form, social in its applications.³

Since what we experience as reflective thought is related causally to social conversation (we learn one from the other), the two are also related functionally. That is, because thought is internalized conversation, thought and conversation tend to work largely in the same way. Of course, in thought some of the limitations of conversation are absent. Logistics, for example, are no problem at all. I don’t have to take the A train or Eastern Airlines flight #221 to get together with myself for a chat. And in thought there are no differences among the participants in preparation, interest, native ability, or spoken vernacular. Each one is just as clever as I can be, or just as dull. On the other hand, in thought some of the less fortunate limitations of conversation may persist. Limitations that may be imposed, for example, by ethnocentrism, inexperience, personal anxiety, economic interests, and paradigmatic inflexibility can constrain my thinking just as they can constrain conversation. If my talk is narrow, superficial, biased, and confined to cliches, my thinking is likely to be so too.

Still, it remains the case that according to this concept of mental activity many of the social forms and conventions of conversation, most of the grammatical, syntactical and rhetorical structures of conversation, and the range, flexibility, impetus, and goals of conversation are the sources of the forms and conventions, structures, impetus, range and flexibility, and the issues of reflective thought.

The relationship I have been drawing here between conversation and thought illuminates the source of the quality, depth, terms, character, and issues of

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thought. The assumptions underlying my argument differ considerably, however, from the assumptions we ordinarily make about the nature of thought. We ordinarily assume that thought is some sort of given, an "essential attribute" of the human mind. The view that conversation and thought are causally related assumes not that thought is an essential attribute of the human mind but that it is instead an artifact created by social interaction. We can think because we can talk, and we think in ways we have learned to talk. As Stanley Fish has put it, the thoughts we "can think and the mental operations [we] can perform have their source in some or other interpretive community." The range, complexity, and subtlety of our thought, its power, the practical and conceptual uses we can put it to, and the very issues we can address result in large measure directly from the degree to which we have been initiated into what Oakeshott calls the potential "skill and partnership" of human conversation in its public and social form.

To the extent that thought is internalized conversation, then, any effort to understand how we think requires us to understand the nature of conversation; and any effort to understand conversation requires us to understand the nature of community life that generates and maintains conversation. Furthermore, any effort to understand and cultivate in ourselves the kind of thought we value most requires us to understand and cultivate the kinds of community life that establish and maintain conversation that is the origin of that kind of thought. To think well as individuals we must learn to think well collectively—that is, we must learn to converse well. The first steps to learning to think better, therefore, are learning to converse better and learning to establish and maintain the sorts of social context, the sorts of community life, that foster the sorts of conversation members of the community value.

This principle has broad applicability and has implications far beyond those that may be immediately apparent. For example, Thomas Kuhn has argued in *The Structure of Scientific Revolutions*, (2nd ed.: Chicago: University of Chicago Press, 1970) that to understand scientific thought and knowledge we must understand the nature of scientific communities. Scientific knowledge changes not as our "understanding of the world" changes. It changes as scientists organize and reorganize relations among themselves (pp. 209-10). Carrying Kuhn's view and terminology further, Richard Rorty argues in *Philosophy and the Mirror of Nature* (Princeton: Princeton University Press, 1979) that to understand any kind of knowledge we must understand what he calls the social justification of belief. That is, we must understand how knowledge is established and maintained in the "normal discourse" of communities of knowledgeable peers. Stanley Fish completes the argument by saying that these "interpretive communities" are the source of our thought and of the "meanings" we produce through

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5. I have explored some of the larger educational implications of Rorty's argument in "Liberal Education and the Social Justification of Belief," *Liberal Education*, 68 (1982), 95-114.
the use and manipulation of symbolic structures, chiefly language. Fish suggests
further, reflecting Erving Goffman's conclusion to The Presentation of Self in
Everyday Life ([New York: Doubleday Anchor, 1959], pp. 252-53), that inter-
pretative communities may also be in large measure the source of what we re-
gard as our very selves (Fish, p. 14). Our feelings and intuitions are as much the
product of social relations as our knowledge.

Educational Implications: Conversation, Collaborative Learning and "Normal
Discourse"

The line of argument I have been pursuing has important implications for edu-
cators, and especially for those of us who teach English—both literature and
composition. If thought is internalized public and social talk, then writing of all
kinds is internalized social talk made public and social again. If thought is in-
ternalized conversation, then writing is internalized conversation re-externalized.6

Like thought, writing is related to conversation in both time and function.
Writing is a technologically displaced form of conversation. When we write,
having already internalized the "skill and partnership" of conversation, we dis-
place it once more onto the written page. But because thought is already one
step away from conversation, the position of writing relative to conversation is
more complex than the position of thought relative to conversation. Writing is at
once two steps away from conversation and a return to conversation. We con-
verse; we internalize conversation as thought; and then by writing, we re-im-
merse conversation in its external, social medium.

My ability to write this essay, for example, depends on my ability to talk
through with myself the issues I address here. And my ability to talk through an
issue with myself derives largely from my ability to converse directly with other
people in an immediate social situation. The point is not that the particular thing
I write every time must necessarily be something I have talked over with other
people first, although I may well often do just that. What I have to say can, of
course, originate in thought, and it often does. But my thought itself is conversa-
tion as I have learned to internalize it. The point, therefore, is that writing al-

6. I make a case for this position in "Writing and Reading as Collaborative or Social Acts," in
Janice N. Hays, et al, eds., The Writer's Mind: Writing as a Mode of Thinking (Urbana, Ill.: Na-
tional Council of Teachers of English, 1983), pp. 159-169. In the current critical climate the distinc-
tion between conversation and speech as sources of writing and thought is important to maintain.
Deconstructionist critics such as Paul de Man argue (e.g., in his Blindness and Insight [Minneapolis:
University of Minnesota Press, 1983]), following Derrida, that writing is not displaced speech but a
primary act. This argument defines "writing" in a much broader sense than we are used to, to mean
something like "making public" in any manner, including speech. Hence deconstructionist "writing"
can be construed as a somewhat static conception of what I am here calling "conversation": a
social act. So long as the conversational, hence social, nature of "writing" in the deconstructionist
sense remains unrecognized, the aversion of deconstructionist criticism to the primacy of speech as
embodying the phenomenological "metaphysics of presence" remains circular. The deconstruc-
tionist argument holds that privileging speech "centers" language in persons. But "persons" are fic-
tions. The alternative proposal by deconstruction, however, that writing is "free play," invites cen-
tering once again, since the figure of play personifies language. The deconstructionist critique has
thus yet to acknowledge sufficiently that language, and its products such as thought and the self, are
social artifacts constituted by "interpretive communities."
ways has its roots deep in the acquired ability to carry on the social symbolic exchange we call conversation.

The inference writing teachers should make from this line of reasoning is that our task must involve engaging students in conversation among themselves at as many points in both the writing and the reading process as possible, and that we should contrive to ensure that students’ conversation about what they read and write is similar in as many ways as possible to the way we would like them eventually to read and write. The way they talk with each other determines the way they will think and the way they will write.

To organize students for these purposes is, in as general a way as I can put it, to organize collaborative learning. Collaborative learning provides a social context in which students can experience and practice the kinds of conversation valued by college teachers. The kind of conversation peer tutors engage in with their tutees, for example, can be emotionally involved, intellectually and substantively focused, and personally disinterested. There could be no better source than this of the sort of displaced conversation—writing—valued by college teachers. Similarly, collaborative classroom group work guided by a carefully designed task makes students aware that writing is a social artifact, like the thought that produces it. Writing may seem to be displaced in time and space from the rest of a writer’s community of readers and other writers, but in every instance writing is an act, however much displaced, of conversational exchange.

Besides providing a particular kind of conversation, collaborative learning also provides a particular kind of social context for conversation, a particular kind of community—a community of status equals: peers. Students learn the “skill and partnership” of re-externalized conversation, writing, not only in a community that fosters the kind of conversation college teachers value most, but also in a community that approximates the one most students must eventually write for in everyday life, in business, government, and the professions.

It is worthwhile to disregard a moment here to establish this last point. In most cases people write in business, government, and the professions mainly to inform and convince other people within the writer’s own community, people whose status and assumptions approximate the writer’s own. That is, the sort of writing most people do most in their everyday working lives is what Richard Rorty calls “normal discourse.” Normal discourse (a term of Rorty’s coinage based on Thomas Kuhn’s term “normal science”) applies to conversation within a community of knowledgeable peers. A community of knowledgeable peers is a group of people who accept, and whose work is guided by, the same paradigms and the same code of values and assumptions. In normal discourse, as Rorty

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7. Some writing in business, government, and the professions may of course be like the writing students do in school for teachers, that is, for the sake of practice and evaluation. Certainly some writing in everyday working life is done purely as performance to please superiors in the corporate or department hierarchy, tell them what they already know, and demonstrate to them the writer’s proficiency as a writer. It may be true, therefore, that learning to write to a person who is not a member of one’s own status and knowledge community, that is, to a teacher, has some practical everyday value. But the value of writing of this type is hardly proportionate to the amount of time students normally spend on it.
puts it, everyone agrees on the "set of conventions about what counts as a relevant contribution, what counts as a question, what counts as having a good argument for that answer or a good criticism of it." The product of normal discourse is "the sort of statement that can be agreed to be true by all participants whom the other participants count as 'rational'" (p. 320).

The essay I am writing here is an example of normal discourse in this sense. I am writing to members of my own community of knowledgeable peers. My readers and I (I presume) are guided in our work by the same set of conventions about what counts as a relevant contribution, what counts as a question, what counts as having a good argument for that answer or a good criticism of it. I judge my essay finished when I think it conforms to that set of conventions and values. It is within that set of conventions and values that my readers will evaluate the essay, both in terms of its quality and in terms of whether or not it makes sense. Normal discourse is pointed; it is explanatory and argumentative. Its purpose is to justify belief to the satisfaction of other people within the author's community of knowledgeable peers. Much of what we teach today—or should be teaching—in composition courses is the normal discourse of most academic, professional, and business communities. The rhetoric taught in our composition textbooks comprises—or should comprise—the conventions of normal discourse of those communities.8

Teaching normal discourse in its written form is central to a college curriculum, therefore, because the one thing college teachers in most fields commonly want students to acquire, and what teachers in most fields consistently reward students for, is the ability to carry on in speech and writing the normal discourse of the field in question. Normal discourse is what William Perry describes as discourse in the established contexts of knowledge in a field, discourse that makes effective reference to facts as defined within those contexts. In a student who can integrate fact and context together in this way, Perry says, "we recognize a colleague."9 This is so because to be conversant with the normal discourse in a field of study or endeavor is exactly what we mean by being knowledgeable—that is, knowledge-able—in that field. Not to have mastered the normal discourse of a discipline, no matter how many "facts" or data one may know, is not to be knowledgeable in that discipline. Mastery of a knowledge community's normal discourse is the basic qualification for acceptance into that community.

The kind of writing students find most useful to learn in college, therefore, is not only the kind of writing most appropriate to work in fields of business, government, and the professions. It is also the writing most appropriate to gaining competence in most academic fields that students study in college. What these two kinds of writing have in common is that they are both written within and addressed to a community of status equals: peers. They are both normal discourse.

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8. A textbook that acknowledges the normal discourse of academic disciplines and offers ways of learning it in a context of collaborative learning is Elaine Maimon, et al., Writing in the Arts and Sciences (Boston: Little Brown, 1981).

This point having, I hope, been established, the nature of the particular kind of community that collaborative learning forms becomes clearer. Collaborative learning provides the kind of social context, the kind of community, in which normal discourse occurs: a community of knowledgeable peers. This is one of its main goals: to provide a context in which students can practice and master the normal discourse exercised in established knowledge communities in the academic world and in business, government, and the professions.

But to say this only raises a host of questions. One question is, how can student peers, who are not members of the knowledge communities they hope to enter, who lack the knowledge that constitutes those communities, help other students enter them? The first, more concrete answer to this question is that no student is wholly ignorant and inexperienced. Every student is already a member of several knowledge communities, from canoeing to computers, baseball to ballet. Membership in any one of these communities may not be a resource that will by itself help much directly in learning to organize an essay or explicate a poem. But pooling the resources that a group of peers brings with them to the task may make accessible the normal discourse of the new community they together hope to enter. Students are especially likely to be able to master that discourse collaboratively if their conversation is structured indirectly by the task or problem that a member of that new community (the teacher) has judiciously designed.10 To the conversation between peer tutors and their tutees in writing, for example, the tutee brings knowledge of the subject to be written about and knowledge of the assignment. The tutor brings sensitivity to the needs and feelings of peers and knowledge of the conventions of discourse and of standard written English. And the conversation is structured in part by the demands of the teacher’s assignment and in part by the formal conventions of the communities the teacher represents, the conventions of academic discourse and standard English.

Such conversation among students can break down, of course, if any one of these elements is not present. It can proceed again if the person responsible for providing the missing element, usually but not always the teacher, is flexible enough to adjust his or her contribution accordingly. If, for example, tutees do not bring to the conversation knowledge of the subject and the assignment, then the teacher helps peer tutors see that their most important contribution may be to help tutees begin at the very beginning: how to go about making sufficient acquaintance with the subject matter and how to set out to clarify the assignment. If tutors lack sensitivity to language and to the feelings and needs of their peers, tutees must contribute by making those feelings and needs more clearly evident. If the task or assignment that the teacher has given is unclear or too difficult or too simpleminded to engage students effectively, then the teacher has to revise it. Throughout this process the teacher has to try to help students negotiate the

10. For examples and an explanation of this technique, see my A Short Course in Writing, cited above, and "CLTV: Collaborative Learning Television," Educational Communication and Technology Journal, 30 (1982), 26-40. Also see Clark Bouton and Russell Y. Garth, eds., Learning in Groups (San Francisco: Jossey-Bass, 1983).
rocks and shoals of social relations that may interfere with their getting on with their work together.

What students do when working collaboratively on their writing is not write or edit or, least of all, read proof. What they do is converse. They talk about the subject and about the assignment. They talk through the writer's understanding of the subject. They converse about their own relationship and, in general, about relationships in an academic or intellectual context between students and teachers. Most of all they converse about and as a part of writing. Similarly, what students do when working collaboratively in small groups in order to read a text with understanding—a poem, a story, or another student's paper—is also to converse. They converse in order to reach consensus in answer to questions the teacher has raised about the text. They converse about and as a part of understanding. In short, they learn, by practicing it in this orderly way, the normal discourse of the academic community.

Collaborative Learning and the Authority of Knowledge

The place of conversation in learning, especially in the humanities, is the largest context in which we must see collaborative learning. To say that conversation has a place in learning should not of course seem peculiar to those of us who count ourselves humanists, a category that includes all of us who teach literature and most of us who teach writing. Furthermore, most of us believe that "class discussion" is one of the most effective ways of teaching. The truth, however, is that despite this belief the person who does most of the discussing in most of our discussion classes is the teacher.

This tends to happen because behind our enthusiasm for discussion lies a fundamental distrust of it. The graduate training most of us have enjoyed—or endured—has taught us, in fact, that collaboration and community activity is inappropriate and foreign to work in humanistic disciplines such as English. Humanistic study, we have been led to believe, is a solitary life, and the vitality of the humanities lies in the talents and endeavors of each of us as individuals. What we call discussion is more often than not an adversarial activity pitting individual against individual in an effort to assert what one literary critic has called "will to power over the text," if not over each other. If we look at what we do instead of what we say, we discover that we think of knowledge as something we acquire and wield as individuals relative to each other, not something we generate and maintain in company with and in dependency upon each other.11

Only recently have humanists of note, such as Stanley Fish in literary criticism and Richard Rorty in philosophy, begun to take effective steps toward exploring the force and implications of knowledge communities in the humanistic disciplines, and toward redefining the nature of our knowledge as a social artifact. Much of this recent work follows a trail blazed two decades ago by Thomas Kuhn. The historical irony of this course of events lies in the fact that

Kuhn developed his notion about the nature of scientific knowledge after first examining the way knowledge is generated, established, and maintained in the humanities and social sciences. For us as humanists to discover in Kuhn and his followers the conceptual rationale of collaborative learning is to see our own chickens come home to roost.

Kuhn’s position that even in the "hard" sciences knowledge is a social artifact emerged from his attempt to understand the implications of the increasing indeterminacy of knowledge of all kinds in the twentieth century. To say that knowledge is indeterminate is to say that there is no fixed and certain point of reference, no Arnoldian "touchstone" against which we can measure truth. If there is no such absolute referent, then knowledge must be a thing people make and remake. Knowledge must be a social artifact. But to call knowledge a social artifact, Kuhn argues, is not to say that knowledge is merely relative, that knowledge is what any one of us says it is. Knowledge is maintained and established by communities of knowledgeable peers. It is what together we agree it is, for the time being. Rorty, following Kuhn, argues that communities of knowledgeable peers make knowledge by a process of socially justifying belief. Collaborative learning models this process.

This then is a second and more general answer to the question raised in the preceding section. How can student peers, who are not themselves members of the knowledge communities they hope to enter, help other students to enter those communities? Isn’t collaborative learning the blind leading the blind?

It is of course exactly the blind leading the blind if we insist on the Cartesian model of knowledge: that to know is to "see," and that knowledge is information impressed upon the individual mind by some outside source. But if we accept the premise that knowledge is an artifact created by a community of knowledgeable peers constituted by the language of that community, and that learning is a social and not an individual process, then to learn is not to assimilate information and improve our mental eyesight. To learn is to work collaboratively to establish and maintain knowledge among a community of knowledgeable peers through the process that Richard Rorty calls "socially justifying belief." We socially justify belief when we explain to others why one way of understanding how the world hangs together seems to us preferable to other ways of understanding it. We establish knowledge or justify belief collaboratively by challenging each other’s biases and presuppositions; by negotiating collectively toward new paradigms of perception, thought, feeling, and expression; and by joining larger, more experienced communities of knowledgeable peers through assenting to those communities’ interests, values, language, and paradigms of perception and thought.

If we accept this concept of knowledge and learning even partially and tentatively, it is possible to see collaborative learning as a model of the way that even the most sophisticated scientific knowledge is established and maintained. Knowledge is the product of human beings in a state of continual negotiation or

12. I trace briefly the history of the growing indeterminacy of knowledge and its relevance to the humanities in "The Structure of Knowledge," cited above.
collaborative learning. Education is not a process of assimilating "the truth" but, as Rorty has put it, a process of learning to "take a hand in what is going on" by joining "the conversation of mankind." Collaborative learning is an arena in which students can negotiate their way into that conversation.

Collaborative Learning and New Knowledge

Seen this way, collaborative learning seems unexceptionable. It is not hard to see it as comfortable, not very surprising, not even very new. In discovering and applying collaborative learning we seem to be, if not exactly reinventing the wheel, certainly rediscovering some of the more obvious implications of that familiar and useful device. Collaborative learning, it seems, is no new thing under the sun. However much we may explore its conceptual ramifications, we must acknowledge the fact that people have always learned from their peers and doggedly persist in doing so whether we professional teachers and educators take a hand in it or not. In Thomas Woolfe's Look Homeward Angel Eugene Gant records how in grammar school he learned to write (in this case, form the words on a page) from his "comrade," learning from a peer what "all instruction failed" to teach him. In business and industry, furthermore, and in professions such as medicine, law, engineering, and architecture—where to work is to learn or fail—collaboration is the norm. All that is new in collaborative learning, it seems, is the systematic application of collaborative principles to that last bastion of hierarchy and individualism, the American college classroom.

This comfortable view, while appropriate, may yet be deceptive. If we follow just a bit further the implications of the rationale for collaborative learning that I have been outlining here, we catch a glimpse of a somewhat startling educational scene. Take, for example, the principle that entering an existing knowledge community involves a process of negotiation. Followed to its logical conclusion this principle implies that education is not a rite of passage in which students passively become initiated into an institution that is monolithic and unchanging. It implies that the means by which students learn to negotiate this entry, collaborative learning, is not merely a better pedagogy, a better way of initiating new members into existing knowledge communities. And it implies that collaborative learning as a classroom practice models more than how knowledge is established and maintained. The argument pursued here implies, in short, that in the long run collaborative learning models how knowledge is generated, how it changes and grows.

This way of thinking about collaborative learning is somewhat speculative, but it is nevertheless of considerable interest and importance to teachers of English. If, as Rorty suggests, knowledge is a social artifact, if knowledge is belief justified through normal discourse, then the generation of knowledge, what we call "creativity," must also be a social process. It too must involve discourse. But the discourse involved in generating knowledge cannot be normal discourse, since normal discourse maintains knowledge. It is inadequate for generating new knowledge. Knowledge-generating discourse is discourse of quite another kind. It is, to use Rorty's phrase, abnormal discourse.
In contrast to normal discourse, abnormal discourse occurs between coherent communities or within communities when consensus no longer exists with regard to rules, assumptions, goals, values, or mores. Abnormal discourse, Rorty says, "is what happens when someone joins in the discourse who is ignorant of" the conventions governing that discourse "or who sets them aside." Whereas normal discourse produces "the sort of statement which can be agreed to be true by all participants whom the other participants count as 'rational,'" "the product of abnormal discourse can be anything from nonsense to intellectual revolution." Unlike the participants in normal discourse who sound "rational" to the others in the community, a person speaking abnormal discourse sounds "either 'kooky' (if he loses his point) or 'revolutionary' (if he gains it)" (pp. 320, 339).

The importance of abnormal discourse to the discussion of collaborative learning is that abnormal discourse serves the function of helping us—immersed as we inevitably are in the everyday normal discourse of our disciplines and professions—to see the provincial nature of normal discourse and of the communities defined by normal discourse. Abnormal discourse sniffs out stale, unproductive knowledge and challenges its authority, that is, the authority of the community which that knowledge constitutes. Its purpose, Rorty says, is to undermine "our reliance upon the knowledge we have gained" through normal discourse. We must occasionally undermine this reliance because normal discourse tends to "block the flow of conversation by presenting [itself] as offering the canonical vocabulary for discussion of a given topic" (pp. 386-387).

Abnormal discourse is therefore necessary to learning. But, ironically, abnormal discourse cannot be directly taught. "There is no discipline that describes" abnormal discourse, Rorty tells us, "any more than there is a discipline devoted to the study of the unpredictable or of 'creativity'" (p. 320). What we can teach are the tools of normal discourse, that is, both practical rhetoric and rhetorically based modes of literary criticism such as the taxonomy of figures, new-critical analysis, and deconstructive criticism. To leave openings for change, however, we must not teach these tools as universals. We must teach practical rhetoric and critical analysis in such a way that, when necessary, students can turn to abnormal discourse in order to undermine their own and other people's reliance on the canonical conventions and vocabulary of normal discourse. We must teach the use of these tools in such a way that students can set them aside, if only momentarily, for the purpose of generating new knowledge, for the purpose, that is, of reconstituting knowledge communities in more satisfactory ways.

It is just here that, as I mentioned at the beginning of this essay, we begin to move beyond our earlier suppositions about what people learn through collaborative learning. Defining knowledge as a social artifact established and maintained through normal discourse challenges the authority of knowledge as we traditionally understand it. But by changing what we usually call the process of learning—the work, the expectations, and the social structure of the traditional

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13. Christopher Norris defines deconstruction somewhat simplistically but usefully for most purposes as "rhetorical questioning" (Deconstruction: Theory and Practice [London: Methuen, 1982], p. 21).
Collaborative Learning and the "Conversation of Mankind" 649

classroom—collaborative learning also changes what we usually call the substance of learning. It challenges the authority of knowledge by revealing, as John Trimbur has observed, that authority itself is a social artifact. This revelation and the new awareness that results from it makes authority comprehensible both to us as teachers and to our students. It involves a process of reacclimation. Thus collaborative learning can help students join the established knowledge communities of academic studies, business, and the professions. But it should also help students learn something else. They should learn, Trimbur says, "something about how this social transition takes place, how it involves crises of identity and authority, how students can begin to generate a transitional language to bridge the gap between communities" (private correspondence).

Challenging the traditional authority of knowledge in this way, collaborative learning naturally challenges the traditional basis of the authority of those who teach. Our authority as teachers always derives directly or indirectly from the prevailing conception of the authority of knowledge. In the pre-Cartesian world people tended to believe that the authority of knowledge lodged in one place, the mind of God. In that world teachers derived their authority from their godliness, their nearness to the mind of God. In Cartesian, Mirror-of-Nature epistemology, the authority of knowledge has had three alternative lodgings, each a secular version of the mind of God. We could believe if we chose that the authority of knowledge lodged in some touchstone of value and truth above and beyond ourselves, such as mathematics, creative genius, or the universals of sound reasoning. We could believe that the authority of knowledge lodged in the mind of a person of genius: a Wordsworth, an Einstein, or a Freud. Or we could believe that the authority of knowledge lodged in the nature of the object objectively known: the universe, the human mind, the text of a poem.

Our authority as teachers, accordingly, has had its source in our nearness to one of these secular versions of the mind of God. In the first case we derive our authority from our identification with the "touchstone" of value and truth. Thus, for some of us, mathematicians and poets have, generally speaking, greater authority than, say, sociologists or literary critics. According to the second alternative we derive our authority from intimacy with the greatest minds. Many of us feel that those who have had the good fortune to study with Freud, Faraday, or Faulkner, for example, have greater authority than those who studied with their disciples; or, those who have studied the manuscripts of Joyce's fiction have greater authority than those who merely studied the edited texts. According to the third alternative, we derive our authority as teachers from being in direct touch with the objective world. Most of us feel that those whose knowledge is confirmed by hands-on laboratory experimentation have greater authority than those whose knowledge is based on a synthesis of secondary sources.

Because the concept that knowledge is socially justified belief denies that the authority of knowledge lodges in any of these places, our authority as teachers according to that concept has quite another source as well. Insofar as collaborative learning inducts students into established knowledge communities and teaches them the normal discourse of those communities, we derive our authority as teachers from being certified representatives of the communities of knowl-
edgeable peers that students aspire to join, and that we, as members of our chosen disciplines and also members of the community of the liberally educated public at large, invite and encourage them to join. Teachers are defined in this instance as those members of a knowledge community who accept the responsibility for inducting new members into the community. Without successful teachers the community will die when its current members die, and knowledge as asserted to by that community will cease to exist.

Insofar as collaborative learning helps students understand how knowledge is generated through abnormal discourse, however, our authority as teachers derives from another source. It derives from the values of a larger—indeed, the largest possible—community of knowledgeable peers, the community that encompasses all others. The interests of this largest community contradict one of the central interests of local communities such as professional disciplines and fields of study: to maintain established knowledge. The interest of the larger community is to resist this conservative tendency. Its interest is to bridge gaps among knowledge communities and to open them to change.

The continued vitality of the knowledge communities we value—in particular the community of liberally educated people and its sub-communities, the scholarly and professional disciplines—depends on both these needs being met: to maintain established knowledge and to challenge and change it. As representatives and delegates of a local, disciplinary community, and of the larger community as well, teachers are responsible for the continued vitality of both of the knowledge communities we value. Responsible to both sets of values, therefore, we must perform as conservators and agents of change, as custodians of prevailing community values and as agents of social transition and reacculturation.

Because by giving students access to the "conversation of mankind," to return to Oakeshott's phrase, collaborative learning can serve both of these seemingly conflicting educational aims at once, it has an especially important role to play in studying and teaching English. It is one way of introducing students to the process by which communities of knowledgeable peers create referential connections between symbolic structures and "reality," that is, by which they establish knowledge and by doing so maintain community growth and coherence. To study adequately any text—student theme or play by Shakespeare—is to study an entire social symbolic process, not just part of it. To study and teach English is to study and teach the social origin, nature, reference, and function of symbolic structures.

The view that knowledge is a social artifact, furthermore, requires a reexamination of our premises as students of English and as teachers. To date, very little work of this sort has been done. One can only guess what might come of a concerted effort on the part of the profession as a whole. The effort might ultimately involve "demystifying" much that we now do as humanists and teachers of the humanities. If we bring to mind, for example, a sampling of important areas of current theoretical thought in and allied to literary criticism, we are likely to find mostly bipolar forms: text and reader, text and writer, symbol and referent, signifier and signified. On the one hand, a critique along the lines I have been following here might involve examining how these theories would differ if
they included the third term missing from most of them. How would a psycho-
analytically oriented study of metaphor differ, for example, if it acknowledged
that psychotherapy is fundamentally a kind of social relationship based on the
mutual creation or recreation of symbolic structures by therapist and patient?
How would semiotics differ if it acknowledged that all “codes” are symbolic
structures constituting language communities and that to understand these codes
requires us to examine and understand the complex social symbolic relations
among the people who make up language communities? How would practical
rhetoric look if we assumed that writer and reader were not adversaries but part-
ners in a common, community-based enterprise? How would it look if we no
longer assumed that people write to persuade or to distinguish themselves and
their points of view and to enhance their own individuality by gaining the ac-
quiescence of other individuals? How would it look if we assumed instead that
people write for the very opposite reason: that people write in order to be ac-
cepted, to join, to be regarded as another member of the culture or community
that constitutes the writer’s audience?

Once we had reexamined in this way how English is studied professionally,
we could on the other hand also undertake to reexamine how English is taught
as well. If we did that, we might find ourselves taking issue with Stanley Fish’s
conclusion that to define knowledge as a social artifact generated by interpretive
communities has no effect whatsoever on the way we read and teach literature
and composition. My argument in this essay suggests, on the contrary, that
some changes in our pedagogical attitudes and classroom practices are almost in-
evitable. These changes would result from integrating our understanding of so-
cial symbolic relationships into our teaching—not just into what we teach but
also into how we teach it. For example, so long as we think of knowledge as a
reflection and synthesis of information about the objective world, then to teach
*King Lear* seems to involve providing a “correct” text and rehearsing students
in “correct” interpretations of it. “Correct” here means the text and the inter-
pretations that, as Fish puts it, seem “obvious and inescapable” within the
knowledge community, within the “institutional or conventional structure,” of
which we happen to be members (p. 370).

But if we think of knowledge as socially justified belief, then to teach *King
Lear* seems to involve creating contexts where students undergo a sort of cultur-
al change. This change would be one in which they loosen ties to the knowledge
communities they currently belong to and join another. These two communities
would be seen as having quite different sets of values, mores, and goals, and
above all quite different languages. To speak in one community of a person ask-
ing another to “pray you undo this button” (V, iii) might be merely to tell a mer-
cantile tale, or a prurient one, while in another community such a request could
be both a gesture of profound human dignity and a metaphor of the dissolution
of a world.

Similarly, so long as we think of learning as reflecting and synthesizing infor-
mation about the objective world, to teach expository writing is to provide ex-
amples, analysis, and exercises in the traditional modes of practical rhetoric—
description, narration, comparison-contrast—or examples, analysis, and exer-
cises in the "basic skills" of writing, and to rehearse students in their proper use. But if we think of learning as a social process, the process of socially justifying belief, then to teach expository writing seems to involve something else entirely. It involves demonstrating to students that they know something only when they can explain it in writing to the satisfaction of the community of their knowledgeable peers. To teach this way, in turn, seems to require us to engage students in collaborative work that does not just reinforce the values and skills they begin with, but that promotes a sort of reacculturation.\textsuperscript{14}

The argument I have been making here implies, in short, that students and teachers of literature and writing must begin to develop awareness and skill that may seem foreign and irrelevant to our profession at the present time. Organizing collaborative learning effectively requires doing more than throwing students together with their peers with little or no guidance or preparation. To do that is merely to perpetuate, perhaps even aggravate, the many possible negative efforts of peer group influence: conformity, anti-intellectualism, intimidation, and leveling-down of quality. To avoid these pitfalls and to marshal the powerful educational resource of peer group influence requires us to create and maintain a demanding academic environment that makes collaboration—social engagement in intellectual pursuits—a genuine part of students’ educational development. And that in turn requires quite new and perhaps more thorough analyses of the elements of our field than we have yet attempted.

Reforming Mathematics Classroom Pedagogy: Evidence-Based Findings and Recommendations for the Developmental Math Classroom

Michelle Hodara

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CCRC Working Paper No. 27

A WORKING PAPER IN THE CCRC ASSESSMENT OF EVIDENCE SERIES

Across the first year of a major grant from the Bill & Melinda Gates Foundation, with supplemental funding from Lumina Foundation for Education, CCRC has gathered and synthesized a large body of research evidence regarding strategies that may improve the success of students who attend community college. Working papers in the Assessment of Evidence Series use the research literature to draw conclusions and provide evidence-based recommendations in eight major topic areas: developmental assessment, developmental acceleration, developmental mathematics pedagogy, contextualization of basic skills instruction, online learning, non-academic support, institutional and program structure, and organizational improvement. All the papers in the series are made available on CCRC’s website (http://ccrc.tc.columbia.edu) as they are released.

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Abstract

For developmental education students, rates of developmental math course completion and persistence into required college-level math courses are particularly low. This literature review examines the evidence base on one potential means for improving the course completion and learning outcomes of developmental mathematics students: reforming mathematics classroom pedagogy. Each study examined for this review was classified into one of six sets according to the main instructional approach focused on in the study. The six sets are: student collaboration, metacognition, problem representation, application, understanding student thinking, and computer-based learning. Because most of the studies across the sets did not employ rigorous methods, the evidence regarding the impact of these instructional practices on student outcomes is inconclusive. An analysis of the studies that did employ rigorous designs suggests that structured forms of student collaboration and instructional approaches that focus on problem representation may improve math learning and understanding. This paper concludes by making a number of methodological recommendations, proposing several needed areas of research related to developmental math pedagogy, and suggesting instructional practices that may improve the outcomes of developmental math students.
# Table of Contents

1. **Introduction**................................................................................................................... 1  
   1.1 Studies Included in the Review.................................................................................. 3  
   1.2 Assessing the Quality of Evidence ......................................................................... 4  
   1.3 Organizational Framework ....................................................................................... 5  

2. **Theory, Practice, and Empirical Evidence**................................................................. 6  
   2.1 Student Collaboration ............................................................................................... 6  
   2.2 Metacognition ........................................................................................................... 9  
   2.3 Problem Representation............................................................................................ 11  
   2.4 Application............................................................................................................... 15  
   2.5 Understanding Student Thinking ............................................................................ 18  
   2.6 Computer-Based Learning....................................................................................... 20  

3. **Research Recommendations** .................................................................................... 23  
   3.1 Methodological Recommendations ........................................................................ 23  
   3.2 Directions for Future Research ............................................................................... 24  

4. **Instructional Recommendations** ............................................................................... 26  
   4.1 Structured Student Collaboration............................................................................ 26  
   4.2 Improving Problem Representation ....................................................................... 28  

5. **Summary of Recommendations** ............................................................................... 28  

References........................................................................................................................ 30  

Appendix.......................................................................................................................... 50
1. Introduction

A majority of community college students enroll in developmental education (Bailey, Jeong, & Cho, 2010), but evidence of its effectiveness in promoting student progression and degree completion is mixed. While some studies have found that remediation reduces students’ probability of dropping out (Bettinger & Long, 2009; Lesik, 2007), other studies find that students in remediation accumulate fewer college credits and are less likely to complete a degree (Boatman & Long, 2010; Calcagno & Long, 2008; Martorell & McFarlin, 2008). Equally concerning are the low levels of developmental education course completion, especially for developmental math. At the 57 community colleges participating in the Achieving the Dream: Community Colleges Count initiative (see www.achievingthedream.org), only one third of students who were referred to developmental education completed the recommended sequence of math courses (Bailey et al., 2010). Of the students who enrolled in developmental education courses, only 20% eventually completed a required college-level math course (Bailey et al., 2010).

Failing to complete developmental math and required college-level math not only prevents individuals from earning a college degree and pursuing certain professions but also has consequences for a young adult’s likelihood of employment. Young adults with low levels of quantitative literacy skills, including the types of arithmetic operations and applications typically covered in developmental math courses, are more likely to be unemployed—and, moreover, low levels of quantitative literacy partially account for the lower employment rates for African Americans compared to Whites (Rivera-Batiz, 1992). Given the negative consequences of failing to complete developmental mathematics, it is critical to identify potential ways to improve developmental students’ math success. Other working papers in the CCRC Assessment of Evidence Series discuss potential ways to improve developmental course completion through improved entry assessment (Hughes & Scott-Clayton, 2011), accelerated course structures (Edgecombe, 2011), and contextualized curricula (Perin, 2011). This paper examines the evidence base on another potential means for improving learning outcomes and course completion among developmental mathematics students: reforms to mathematics classroom pedagogy.
While national studies that document the common features of developmental education classroom instruction do not exist (Levin & Calcagno, 2008), typical developmental math pedagogy is thought to rely largely on procedural skill-building (Goldrick-Rab, 2007; Hammerman & Goldberg, 2003). Observational studies at community colleges in California found that mathematics instruction was characterized by review, lecture, independent seat-work, and math problems devoid of application to the real world (Grubb, 2010; Grubb & Worthen, 1999). Although traditional features of math instruction have been linked to better performance on standardized tests and much of the mathematics we encounter in our lives requires the ability to use algorithms to quickly and accurately solve computations, in order to understand mathematics, students need much more than procedural fluency (Hiebert & Grouws, 2007; Kilpatrick, Swafford, & Findell, 2001).

Kilpatrick et al. (2001) identified five interdependent strands of mathematical learning that instructional practices must address to build mathematical proficiency:

1. **conceptual understanding**—the understanding of why and when a mathematical idea is important or useful,
2. **procedural fluency**—the ability to use procedures in the right way and for the right purpose,
3. **strategic competence**—problem formulation and representation,
4. **adaptive reasoning**—logical reasoning about mathematical relationships, and
5. **productive disposition**—the belief that a sustained effort in learning mathematics will lead to greater understanding and benefit one’s life.

This paper discusses forms of instruction that are thought to support components of mathematical learning beyond procedural fluency and should, therefore, develop mathematical proficiency more effectively than traditional instruction.
1.1 Studies Included in the Review

Although the purpose of this literature review is to identify promising developmental math pedagogy, there is very little empirical research on this topic and population specifically; thus, I also reviewed the literature on mathematics pedagogy in elementary and secondary schools and in college-level courses, focusing on empirical studies that evaluate the impact of an instructional practice on student outcomes.¹ The elementary and secondary school math pedagogy literature is included not only because it is more prevalent than empirical research on math instruction in higher education but also because recommended best practices in teaching are often similar across grades and even subjects. For example, important works that outline best practices for developmental education (e.g., Blair, 2006; Boroch et al., 2007; Boylan, 2002) and K-12 mathematics teaching (e.g., Donovan & Bransford, 2005) provide similar recommendations: that educators connect new knowledge to prior learning; use a variety of instructional methods, including learner-centered activities; and provide students with feedback through the use of ongoing assessment. Reviewing the K-12 empirical literature illustrates how these general recommendations are implemented in the classroom in ways that are effective or ineffective for primary and secondary students. These findings can then be used to make recommendations regarding how pedagogy that works in the K-12 math classroom could perhaps be adapted for adult students in the developmental education classroom in an effort to apply commonly accepted best practices in teaching.

It is important to note that articles on curriculum reforms that may also lead to or require changes to pedagogy are not included in this review. Curriculum reforms typically can involve so many interconnected instructional changes that it is difficult to isolate the effects of the individual reforms (Hamilton et al., 2003). For example, this

¹ The inclusion criteria for this study encompass qualitative and quantitative (excluding single-subject design) studies published from 1990 to the present whose target population includes students in K-12 schools and institutions of higher education in the United States. To find publications within the topic scope, major databases and websites were searched using the term mathematics in combination with instruction or pedagogy or in combination with instructional (or pedagogical) practices or strategies. Databases and websites included: EBSCO’s Academic Search Premier, Education Research Complete, Education Full Text (Wilson), ERIC, JSTOR, ProQuest, state higher education websites, community college system websites, Mathematical Association of America (MAA), American Mathematical Association of Two-Year Colleges (AMATYC), and Google Scholar. I also conducted a manual search of the following pertinent publications: Journal of Developmental Education, Remedial and Special Education, Community College Journal of Research & Practice, Community College Review, and Community College Journal.
paper does not review a study that evaluated the impact of a reform-based undergraduate calculus textbook (Darken, Wynegar, & Kuhn, 2000), which includes exercises that use group work and technology and emphasize conceptual understanding. The authors did not report the extent to which instructors who volunteered to use these texts incorporated these changes to pedagogy in their classrooms, and it is impossible to understand the discrete impact of each pedagogical change on the overall results. In contrast, while many studies included in this review required changes to content (e.g., using multi-step word problems rather than problems that require only a few steps to solve), they focus on the methods teachers use to teach the content.

1.2 Assessing the Quality of Evidence

In reviewing papers, I critiqued the findings according to the strength and rigor of the research designs of the studies in order to evaluate the direction and quality of evidence on math pedagogy. Table 1 (found in the appendix) provides a concise summary of each reviewed article, including the author’s findings, effect size of the results, and methodological problems that weaken the internal validity of the results. This review describes the results of rigorous studies and draws conclusions about effective pedagogy. In general, to be considered rigorous, a study had to be transparent about the comparability of the treatment and control conditions, providing some confidence that any outcomes are the result of the instructional intervention, not differences between the treatment and control groups. Most importantly, rigorous studies either demonstrated that there were no pretreatment ability differences between students who received the instructional intervention and students in the comparison group or statistically controlled for pretreatment ability, and they made an effort to assign similar instructors to the treatment and comparison groups. The results of the remaining studies are inconclusive because they could be due to differences between the treatment and control group rather than the instructional intervention.

2 There were four methodological flaws commonly found across studies: student design non-equivalency, teacher design non-equivalency, possible attrition issues, and lack of a comparison group. The notes for Table 1 include a detailed explanation of each of the four main flaws.
3 Except for a few higher education studies, the results of the non-rigorous studies are not described in this review, but they can be found in Table 1.
1.3 Organizational Framework

There are several ways to categorize instructional practices. Grubb (2010) organizes practices along a behaviorist–constructivist continuum. Commonly accepted groupings of instructional practices include broad categories, such as student-centered versus teacher-directed instruction or direct instruction versus inquiry-based teaching (Hiebert & Grouws, 2007). The current paper uses a more detailed classification system driven by specific theories of learning, which provide concrete explanations of particular mechanisms underlying different pedagogical approaches. Based on an inductive approach, studies were organized into six sets, each containing similar types of practices that share a clearly identifiable (although not always explicitly identified by each study’s authors) theory of learning. Each set of practices is therefore supported by a particular theory that explains why these practices should lead to improved math learning and understanding. The six sets are student collaboration, metacognition, problem representation, application, understanding student thinking, and computer-based learning.4

In the first section, for each of the six sets, I explain the relevant theories that support the pedagogical practices in the set, provide an example of how the theoretical concepts are applied in the developmental math classroom today, and evaluate the empirical evidence from the articles in the set. Subsequent sections describe the recommendations based on the review of this literature, including methodological recommendations and new directions for developmental math pedagogy research. The paper concludes with examples of instructional changes to the developmental math classroom that may contribute to improved outcomes for developmental math students.

4 The practices across the six sets can interact in the classroom and overlap in myriad ways. Hiebert and Grouws (2007) emphasize that “teaching is a system of interacting features” (p. 374); different features do not fit easily into categories. For this paper, studies were categorized according to the feature by which they were most clearly defined. For example, in the application set, instructional practices always involve students working together and often promote metacognition and problem representation skills. Studies in the application set are distinct from studies in the other five sets because instruction is characterized by the use of elaborate problem-solving activities that use real-world contexts. This type of pedagogy is supported by distinct theories of learning, suggesting that student learning in classrooms that use real-world problem solving is enhanced in different ways than learning in classrooms that use student collaboration, promote metacognition, and/or build problem representation but do not use real-world problem solving.
2. Theory, Practice, and Empirical Evidence

2.1 Student Collaboration

This first set of studies evaluates different models of student collaboration in the math classroom. Some studies examine the impact of informal forms of student collaboration, while others evaluate the effectiveness of more structured forms of peer collaboration, such as Math Excel, Peer-Led Team Learning, the Learning Together model of cooperative learning, peer-assisted learning strategies (PALS), peer-mediated instruction (PMI), and Team Accelerated Instruction.

**Theory.** Springer, Stanne, and Donovan (1999) organize the theories that support student collaboration into three theoretical perspectives that identify the different mechanisms that link small-group instruction to improved student outcomes. The motivational perspective supports the notion that in competitive learning environments, the probability of success decreases at an increasing rate as other students succeed, but in small-group learning environments, success is dependent on students working together to achieve a common goal. The affective or humanist perspective explains that interaction among students leads to a nonthreatening environment in which underrepresented students have more opportunities to participate and learn. Finally, according to the cognitive perspective, student collaboration on open-ended questions leads to greater cognitive growth, and the act of explaining material to another student is one method of cognitive elaboration, which facilitates the retention of information.

Johnson and Johnson’s social interdependence theory, which is cited in a number of empirical and instructional publications on cooperative learning in higher education math courses (e.g., Arendale, 2004; Dees, 1991; Norwood, 1995; Summers & Svinicki, 2007; Zachry, 2008), draws from all three theoretical perspectives (motivational, affective, and cognitive). Negative interdependence, which is characterized by a competitive learning environment, can potentially be demotivating because students can only succeed if others are failing (Johnson, Johnson, & Smith, 1991). In addition, in both classrooms with no interdependence (where students work on their own) and classrooms with negative interdependence, students do not benefit from an improvement in social skills and cognitive growth that is thought to result from positive social interactions and
the exchange of information between peers (Johnson et al., 1991). On the other hand, positive interdependence, where the success of one individual is dependent on the success of others, is found in cooperative learning environments characterized by face-to-face interaction, personal responsibility in working toward a shared goal, the use of interpersonal skills, and group processing through the exchange of feedback, explanations, and other information (Johnson et al., 1991). In structured cooperative learning situations with these elements, motivational, affective, and cognitive mechanisms are thought to lead to improvements in learning outcomes.

Student collaboration methods are also supported by Lev Vygotsky’s theory of the zone of proximal development and the theory of constructivism. The zone of proximal development is the cognitive space between what a learner can do independently (i.e., their ability) and what a learner can do with the aid of a teacher or through peer collaboration (i.e., their potential) (Safford-Ramus, 2008). Constructivism describes learning as a process in which knowledge is constructed through building on prior experiences, engaging in self-discovery, and collaborating with peers (Yilmaz, 2008). Collaborative learning in developmental math education is a way to both expand students’ zone of proximal development and apply the principles of constructivist learning (Casazza, 1998; Norwood, 1995; Safford-Ramus, 2008).

**Empirical evidence.** For the most part, the 15 studies in this set (see Table 1) found that student collaboration has a positive impact on math learning. Most of these studies did not ensure treatment and control group equivalency; thus, their results could be due to factors other than the student collaboration method. However, five rigorous elementary school student collaboration studies demonstrate that highly structured forms of student collaboration are especially effective for low-achieving math students.5

With PALS and PMI, teachers train students to follow a routine that involves students taking turns, acting either as the tutor who asks questions and provides feedback at every step of the problem-solving process or as the tutee who answers questions at every step (Fuchs, Fuchs, Phillips, Hamlett, & Karns, 1995; Fuchs et al., 1997; Fuchs, Fuchs, & Karns, 2001). Lower-achieving students are usually paired with higher- or

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5 The Calhoon and Fuchs (2003) study is also rigorous but evaluates the effects of PALS and curriculum-based measurement (CBM) in combination and, therefore, the outcomes cannot be attributed strictly to student collaboration.
average-achieving students. Across the three studies of PALS and PMI (Fuchs et al., 1995; Fuchs et al., 1997; Fuchs et al., 2001), results varied for students with different levels of math aptitude. Students with learning disabilities and average-achieving students usually made small gains in achievement compared to their counterparts in the control classrooms. Lower-achieving students benefited the most from the different student collaboration treatments, making small to moderate gains on all tests but one that measured application skills in one study. Higher-achieving students only benefited from paired work when more complex math tasks were included in the PMI treatment.

Similarly, a randomized study by Ginsburg-Block and Fantuzzo (1998) found that low-income, low-achieving third- and fourth-grade students who used a highly structured peer-tutoring format to review and reinforce math skills outperformed comparable students who received traditional instruction. In contrast, Karper and Melnick’s randomized study (1993) in a wealthy school district found that the cooperative learning technique Team Accelerated Instruction had no impact on the math achievement of students in the treatment group. Taken together, the five studies suggest that structured student collaboration may be more beneficial for low-achieving elementary school students struggling with math.

Finally, the highest quality developmental education study in this review (Dees, 1991) suggests that an instructor-designed, structured student collaboration method may be a promising practice for the developmental math classroom. Dees (1991) randomized over 70 students in her developmental math course into four laboratory sections taught by graduate assistants: two that used small-group instruction and two that used teacher-directed instruction. Students in the cooperative learning lab outperformed students in the control group on teacher-made tests and a standardized final exam; however, the internal validity of the study’s findings is undermined by the lack of detail about the research design, such as how graduate assistants were assigned to sections.

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6 One concern with these studies is that although teachers were randomized to the treatment and control classrooms and implemented the treatment with the whole class, due to resource constraints only a subset of students were chosen to take the posttest. However, these studies show that there are no statistical differences along observable characteristics between the treatment and control students in the whole class and subset of students.

7 The Dees article meets the inclusion criteria because it was published after 1990; however, it is important to note that the study took place in 1982, so it is much older than most of the studies included in this review that were conducted during the past 20 years.
Peer-Led Team Learning (PLTL) was first established at the City University of New York and has since been used in math and science courses at colleges across the country (Arendale, 2004). Through the PLTL program, advanced students are trained in teaching and cooperative learning techniques, becoming “peer leaders” who lead weekly collaborative workshops with small groups of students (Arendale, 2004). The developmental math faculty at Mountain Empire Community College (MECC) in Virginia have implemented PLTL in the developmental math course Algebra I.* Peer leaders are assigned to sections of Algebra I, which they attend for one hour on Mondays and Wednesdays. Students from these courses who have chosen to participate in PLTL meet with their peer leaders during the PLTL session, named “Power Hour,” held on Fridays directly before their Algebra I course. During the PLTL sessions, the peer leaders and students work cooperatively in small groups on areas of Algebra the students are struggling with. A PLTL leader who was a former tutee in the program spoke about her experience with PLTL: “I love math. I’m a math tutor. But after being out of school for so long, it was like reading Hebrew the first semester, and the Power Hour made me feel more comfortable. I could understand mostly what my instructor told me, but it was just a different language coming from my PLTL leader.”

*Information on PLTL is from a Community College Research Center site visit to MECC in spring 2010.

2.2 Metacognition

The second set of studies includes instructional practices that promote metacognition, or an awareness of one’s own thought processes, through comprehension monitoring, cognitive strategy instruction, or using writing and questioning during the problem-solving process to foster self-reflection.

Theory. The connection between metacognition and math learning is supported by a number of theories. Garofalo and Lester (1985) extended Flavell’s (1979) theory about the role of metacognition to identify its two main aspects, “knowledge of cognition” and “regulation of cognition” (p. 164), and apply them to the mathematical problem-solving process. In Garofalo and Lester’s (1985) cognitive–metacognitive framework, the knowledge of cognition begins in the orientation phase, in which the problem solver assesses the information given about the mathematical task, his or her level of familiarity with the task, the difficulty of the task, and possible strategies to use. Next, in the organization or planning phase, the regulation of cognition aids the problem
solver in connecting his or her understanding of the concept to an understanding of the appropriate strategies to use to solve the problem. In the execution stage, the problem solver solves the problem using the necessary strategies and procedures. Finally, during the verification stage, the problem solver confirms that the solution is correct by checking the computations and problem-solving process for errors. Garofalo and Lester (1985) argue that mathematical problem solving can be improved by training students to incorporate the stages of metacognition into their problem-solving process.

The theory of information processing provides another justification for the importance of metacognition, contending that learning occurs as individuals think about their own thinking as they retrieve stored information from memory (i.e., prior knowledge) and use it to process new information (Safford-Ramus, 2008). Metacognition has also been integrated into forms of constructivism. For example, in Narode’s (1989) description of instruction in a constructivist developmental math program for students at the University of Massachusetts, Amherst, he writes, “the method of instruction incorporates two key notions: constructivism, the idea that students must construct knowledge for themselves, and metacognition, the supposition that the vehicle for the construction of knowledge is self-reflection” (p. 6). In the math classroom, instruction that uses the cognitive–metacognitive framework would emphasize not only each student’s ability to solve problems but also each student’s capacity to assess a problem’s difficulty, choose the appropriate strategy or strategies to solve a problem, engage in self-monitoring during the problem-solving process, and evaluate the final solution for its accuracy.

**Empirical evidence.** The eight reviewed studies (see Table 1) describe unique pedagogical practices that seek to improve students’ ability to monitor their problem-solving process, but only one study employed a rigorous experimental design. In Tournaki’s (2003) study, second-grade students with and without disabilities were randomized into a control group and two treatment groups in which, in addition to their regular class time, students received either explicit instruction in either strategy instruction (verbalizing problem-solving steps), or drill-and-practice strategies. Students with learning disabilities who received strategy instruction experienced large gains in addition facts performance compared to students with learning disabilities who received
drill-and-practice instruction, but there were no differences in addition facts achievement between students without disabilities who received the strategy instruction versus drill-and-practice instruction. Tournaki concludes that explicit instruction in problem-solving strategies, even for tasks as simple as adding, may be especially important for students with learning disabilities.

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**Metacognition in Practice**

The College Transition Initiative (CTI) at the CUNY community colleges prepares GED graduates to take the COMPASS placement math exam, with the related aims of reducing their need for remediation, deepening their understanding of algebra, and preparing them for their first college-level math course (Hinds, 2009). In addition to a supportive structure in which the CTI math course is part of a learning community and an innovative math curriculum, CTI math instruction employs a number of non-traditional pedagogical practices. Procedural rules are not taught; in their place, students build their conceptual understanding by discussing mathematical relationships, and rules that emerge through these activities are discussed at the end of lessons so that students can also build their procedural fluency. The instructor does not lecture; instead, the instructor asks students higher order thinking questions about contextualized functions that help students transition to more abstract work. For most of class time, students work in groups to solve problems and are constantly involved in discussions sparked by metacognitive questioning. Common questions asked by the instructor include:

- What did you do?
- Why did you do that?
- Do you agree with what she/he just said? Why?
- Did any of you do it differently? Why?
- What do you see?
- Does this remind you of anything?

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2.3 Problem Representation

The third set of articles encompasses pedagogy that improves students’ problem representation skills, such as the use of multiple representations and strategies during the problem-solving process, the learning/teaching approach, concept-based instruction, the concrete-to-representational-to-abstract (CRA) instructional sequence, schema-based
instruction, and the Quantitative Understanding: Amplifying Student Achievement and Reasoning (QUASAR) project.\(^8\)

**Theory.** The cognitive phases of problem solving are analogous to the metacognitive framework except that in the first phase, called the problem representation phase, the focus is on building a mental representation of the problem rather than assessing the problem’s difficulty, strategies to use, and other aspects of the problem-solving process (Brenner et al., 1997). The importance of problem representation is based on the cognitive theory that problem solvers must understand the connection between the problem and its different representations before they can move on to planning and executing the procedural steps to solve a problem (Brenner et al., 1997; Chappell, 2006). By focusing on the procedures needed to execute or solve problems, teachers and instructors neglect this critical first phase of problem solving. Higher levels of math, such as algebra, require an understanding of how algebraic (or symbolic) representations can be represented by graphs and other forms, so students who did not learn problem representation skills in lower-level math courses, such as pre-algebra, may experience increasing difficulties as they progress in math (Brenner et al., 1997; Zawaiza & Gerber, 1993).

The cognitive phases of problem solving suggest that problem representation skills will lead to more success in the use of procedures during the problem execution phase, and Rittle-Johnson, Siegler, and Alibali (2001) find empirical evidence suggesting that, in fact, problem representation is the mechanism underlying the process by which conceptual knowledge can lead to improved procedural fluency, which in turn can lead to improvements in conceptual knowledge. In the Rittle-Johnson et al. study, fifth-grade students were randomly assigned to receive assignments on placing decimals on a number line that provided different levels of representational supports (e.g., a zero-to-one number line with no markings versus a zero-to-one number line with the tenths place marked). The level of representational supports determined students’ problem representation skills, measured by their ability to explain why they chose a spot on the number line to represent each decimal, on an intervention test, and their procedural

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\(^8\) The QUASAR project includes many more instructional components than strategies that improve students’ problem representation skills (Silver & Stein, 1996), but the QUASAR articles in this review focus on instructional tasks that use multiple representations or solution strategies.
fluency, measured by marking the position of a decimal on a number line, on a posttest. Procedural skill performance was then a significant predictor of conceptual knowledge, measured by student performance on new tasks that required an understanding of decimal fractions, on a posttest.

The Rittle-Johnson et al. study (2001) does not suggest a specific instructional strategy, such as providing students with worksheets that include representational supports. Rather, it supports the theory that students who develop an understanding of how concepts can be represented in different, connected ways will be able to link these representations to the procedures that are necessary to solve a problem. This will lead to more accurate procedural fluency (or solution execution), and solving problems with understanding will enhance conceptual knowledge.

**Empirical evidence.** Five of the nine studies in this set (see Table 1) are among the strongest studies in this review and provide compelling evidence that improving students’ problem representation skills has a small to moderate positive effect on math learning. The four high-quality studies that took place in elementary and middle school classrooms (Brenner et al., 1997; Jitendra et al., 1998; Jitendra et al., 2009; Witzel, Mercer, & Miller, 2003) found support for the routine use of multiple representations during problem solving by teachers and students.

In the only higher education study in this set, Chappell (2006) employed a number of methods to ensure that even though students self-selected into concept-based calculus and traditional calculus sections (unaware of the instructor or instructional method of each section), the faculty and students across both groups were comparable. In addition, frequent, unannounced classroom observations by faculty not directly involved in the study confirmed that in the concept-based sections, faculty taught students how to solve problems using numerical, graphical, and algebraic methods while constantly connecting new ideas to prior knowledge. In the control sections, faculty moved through the textbook teaching definitions and formulas in a linear manner. Students in the concept-based sections performed significantly better on the midterm and final and were better able to transfer their understanding to unfamiliar concepts. For example, on a final exam problem that had never been introduced in any of the classes, 88% of the students in the concept-based classrooms answered this question correctly, and only 3% did not support
their answer with an explanation. Only 54% of the students in the traditional sections answered this question correctly, with most of them providing textbook definitions to explain their answer and 31% not providing any explanation at all.

**Problem Representation in Practice**

The traditional approach to introducing radical equations teaches the procedural skills related to solving them, as in the following exercise*:

Solve $2\sqrt{x+2} = 10$

First, isolate the radical by dividing both sides of the equation by 2:

$\sqrt{x+2} = 5$

Next, square both sides of the equation:

$\left(\sqrt{x+2}\right)^2 = 5^2$

$x + 2 = 25$

$x = 23$

Now check for extraneous solutions.

The following exercise is thought to better promote conceptual understanding of radical equations:

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x) = \sqrt{x}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$\sqrt{0} = 0$</td>
</tr>
<tr>
<td>1</td>
<td>$\sqrt{1} = 1$</td>
</tr>
<tr>
<td>2</td>
<td>$\sqrt{2} = 1.414$</td>
</tr>
<tr>
<td>3</td>
<td>$\sqrt{3} = 1.732$</td>
</tr>
<tr>
<td>4</td>
<td>$\sqrt{4} = 2$</td>
</tr>
<tr>
<td>5</td>
<td>$\sqrt{5} = 2.236$</td>
</tr>
<tr>
<td>7</td>
<td>$\sqrt{7} = 2.646$</td>
</tr>
<tr>
<td>9</td>
<td>$\sqrt{9} = 3$</td>
</tr>
</tbody>
</table>

Graph the basic square root function using the data from the input/output table. *Drawing the graph by hand helps students remember concepts about domain.*

Now draw the graphs of $f(x) = 1$, $f(x) = 2$, $f(x) = 3$, and $f(x) = -1$ all on the same axes. *This allows students to see the points of intersection (the solutions) and where there are no points of intersection (the extraneous solutions). Then, they will be more prepared to solve the radical equation below.*

Solve $2\sqrt{x+2} = 10$. 
2.4 Application

Application-oriented instructional approaches include project-based learning, the modeling-based approach, the functional approach, enhanced anchored instruction, the algorithmic instructional technique, and culturally responsive pedagogy, all of which are designed to teach math concepts and skills through real-world problem-solving. Many of these instructional approaches may be referred to as “problem-based learning” (Boroch et al., 2007, p. 45), which is one form of contextualization (Perin, 2011).

Theory. The link between application of math concepts to students’ everyday lives and improvements in math performance is supported by the theory of situated cognition (The Cognition and Technology Group at Vanderbilt, 1990). Situated cognition is based on the idea that since an important objective of schooling is the transfer of skills from the abstract to the concrete, skills and concepts should not be taught without reference to the real world; rather, they should be situated in authentic activities (Brown, Collins, & Duguid, 1989). Authentic activities value the experiences and knowledge students bring with them to the classroom and allow students to learn math in a context that is meaningful to them. For example, culturally responsive pedagogy, which utilizes authentic, culturally based activities, is believed to be more effective than traditional instruction because “it filters curriculum content and teaching strategies through their cultural frames of reference to make the content more personally meaningful and easier to master” (Gay, 2000, p. 24).
The cognitive apprenticeship model of learning explains how pedagogy and content (e.g., authentic activities) based on the theory of situated cognition are connected to student learning and transfer of skills. In this model, students are apprentices who through guided practice become independent learners, and the skills they learn are both physical and cognitive, since “knowing and doing” (Brown et al., 1989, p. 39) are inseparable. First, teachers introduce a new concept by modeling how to solve a problem that students are familiar with; then, as students become more comfortable with the concept, they are given authentic activities to work on in collaborative groups (Brown et al., 1989). Finally, as opposed to traditional instruction that begins with equation solving and ends with word problems that situate math in real-world contexts, instructional approaches based on situated cognition may end with students independently using algorithmic procedures to solve problems that assess the understanding of the same math ideas and skills embedded in the authentic activities (Brown, et al., 1989; Laughbaum, 2003; Vasquez, 2003). In other words, this learning process is thought to aid in the transfer of math skills to both procedural problem solving and open-ended, realistic problem-solving activities (Boaler, 1998).

Another mechanism that may explain why application-oriented instructional approaches in this set may improve math learning is motivation. Motivation may be the result of pedagogical techniques, such as collaborative learning (Johnson et al., 1991; Springer et al., 1999), and the contextualized curriculum (Perin, 2011). The practices in this set may improve student learning through different mechanisms because they are defined by a number of instructional and curricular supports, including instructor scaffolding, complex problem-solving embedded in real-world or culturally based situations, collaborative group work, and hands-on activities that use technology that helps students contextualize math concepts in real-world problems (Bottge, Heinrichs, Chan, & Serlin, 2001; Bottge, Heinrichs, Mehta, & Hung, 2002; Brenner, 1998; Ellington, 2005a, 2005b; Ganter & Jiroutek, 2000; Hickey, Moore, & Pelligrino, 2001; Hollar & Norwood, 1999; Kennedy, Vasquez, & Huber, 2003; Laughbaum, 2003; Lipka & Adams, 2004; O’Callaghan, 1998; Shore, Shore, & Boggs, 2004; Vasquez, 2003, 2004).
Application in Practice

At Maricopa community colleges, students in arithmetic review courses were given two weeks to solve the following problem in groups (Tannehill & Zeka, 1997):

You are interested in purchasing a new vehicle.
What should your annual salary be to afford the car you want?

Instructors acted as facilitators, providing students with web resources and formulas to help them calculate their dept-to-income ratio, car costs, loan payments, and other critical pieces of information that students needed to be able to calculate how much they would have to earn to finance the car they want.

**Empirical evidence.** The eleven studies in this set (see Table 1) consistently find a positive association, with trivial to large effect sizes, between teaching math through application and improved performance on tests of conceptual understanding. However, only the Hickey et al. (2001) study attempted to ensure that the treatment and control conditions and students and teachers in both groups were comparable, and the treatment effects were too small for the results to conclusively support the use of a video series that takes elementary students on complex math adventures. In many of the studies in this set, treatment students outperformed control students on tests of understanding, but there were no differences in performance on more traditional tests of procedural fluency (Bottge et al., 2001; Bottge et al., 2002; Hickey et al., 2001; Hollar & Norwood, 1999; O’Callaghan, 1998)—a finding that is consistent with studies in the problem representation set (Brenner et al., 1997; Chappell; 2006). These studies highlight the possible trade-offs that are made when reform-based instructional practices are used in the math classroom at both the K-12 and college levels. While these practices show promise for improving students’ conceptual understanding, which is considered a necessary condition to be successful in math at any level (Bransford, Brown, & Cocking, 1999; Hiebert & Grouws, 2007; Katz, 2007; Kilpatrick et al., 2001), they may require more time and preparation and sometimes do not improve students’ computational skills (Brenner et al., 1997).
2.5 Understanding Student Thinking

The fifth set of practices encompasses instructional methods that help teachers understand student thinking and adjust their instruction to meet the needs of their students. These pedagogical practices include assessment methods that are used during instruction to monitor student progress and guide instruction, such as frequent testing, classroom assessment techniques, classroom voting, the Keystone Method, progress monitoring, and curriculum-based measurement (CBM).

Theory. While cognitive and behavioral theories explain the relationship between assessment and students’ understanding of their own thinking, theories and applications of cognitively guided instruction (CGI) explain the importance of teachers’ understanding of student thinking (Bransford, Brown, & Cocking, 1999; Carpenter, Fennema, Peterson, Chiang, & Loef, 1989; Villasenor & Kepner, 1993). CGI is the use of instructional practices that are informed by research on how students solve math problems and by knowledge of the prior math skills and misconceptions students bring to the math classroom (Carpenter et al., 1989; Villasenor & Kepner, 1993). CGI is based on a cognitive perspective of teaching that examines the interaction between teachers’ instructional choices, their knowledge of student thinking, and student performance (Carpenter et al., 1989). The cognitive view of teaching hypothesizes that teachers who have an understanding of their students’ thinking (as well as strong subject matter and pedagogical content knowledge) will make better instructional choices that result in improvements in student math achievement (Ball & Bass, 2000; Bransford et al., 1999; Carpenter et al., 1989; Kieran, 2007).

Applying the cognitive view of teaching can be challenging, however, since monitoring the progress of a classroom of students “create[s] an overwhelming demand on the cognitive resources of the teacher” (Carpenter et al., 1989, p. 501). As a result, teachers are only able to make small adjustments in their instruction based on their assessment of student understanding and thinking. However, today, formative assessment, or the adjustment of instruction based on performance of students, can be driven by technological tools that provide an efficient means of monitoring student progress through frequent assessment, especially at the college level (Blair, 2006; Boroch et al., 2007; Cline, 2006). Technological supports, such as clickers (see, e.g., Cline,
are aligned with a cognitively based perspective on instruction that hypothesizes that teachers make more effective instructional choices that help students build their mathematical understanding when they are able to assess students’ prior knowledge and current understanding of the material.

**Empirical evidence.** While it is generally accepted that college instructors should adapt instruction to meet the needs of their students through meaningful, ongoing assessment (Adams, 1997; Blair, 2006; Boroch et al., 2007; Boylan, 2002; Siadat et al., 2008), the four studies targeting college and developmental education students did not utilize comparison groups or compared non-equivalent groups (see Table 1), so their findings cannot confirm the positive impact of ongoing, formative assessment. Among the nine K-12 studies (see Table 1), the rigorous studies by Fuchs and Fuchs (1990), Fuchs, Fuchs, Hamlett, and Stecker (1991), and Fuchs, Fuchs, Hamlett, Phillips, and Bentz (1994) find strong support for using CBM that provides teachers with expert recommendations to make instructional changes with elementary school students with learning disabilities. However, given that all three studies were conducted by the same researchers in the same setting, confidence in the validity of these studies would be strengthened if their results were replicated elsewhere.

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**Understanding Student Thinking in Practice**

Daley College implemented the Keystone Method in Elementary Algebra, Intermediate Algebra, and College Algebra (Siadat et al., 2008). This instructional method utilizes daily assessment of students to inform the instructor of the progress of the class and each student. The instructor can then adjust instruction accordingly and inform students of their individual progress. Before each class, the instructor conducts an item analysis of student answers on the quiz questions that tells the instructor which areas should be retaught or reviewed the next day and which problems to include on future quizzes. If the standard deviation of the quiz scores is greater than 0.25 (i.e., if there is considerable divergence in student understanding of specific skills), the instructor creates small, heterogeneous groups of students with one from each of the quiz performance quartiles. As a result, groups have weak, average, and high-performing students who can motivate and help each other learn the material. If quiz scores reflect a general understanding of skills across all students, the instructor uses more traditional modes of teaching to move on to new concepts.
2.6 Computer-Based Learning

This last set includes studies in which students work through technology-delivered mathematics content at their own pace during some or all of classroom time, with the instructor providing some face-to-face interaction through individualized attention, delivery of instruction, or technology support. Computer-based learning may also encompass many of the approaches previously discussed, such as using computer-based technology to provide students with real-world problem-solving opportunities and monitoring the progress of students in order to guide instruction and content. Computer-based learning includes course redesign models, a popular trend in developmental mathematics where some or all of face-to-face instruction is replaced with a set of self-paced, online curriculum modules (Epper & Baker, 2009; Twigg, 2005); hybrid or blended online learning; and forms of computer-based learning where the traditional course structure is maintained and the instructor still has a role in the classroom.

Theory. Originally, computer-based instruction was based on the theory of behaviorism (Hung, 2001; Safford-Ramus, 2008). According to behaviorism, responses to stimuli (e.g., questions) that are directly followed by positive or negative reinforcement will lead to the conditioning of consistent, correct responses representing the learning of material (Safford-Ramus, 2008). In one of the first educational applications of behaviorism, a “teaching machine” provided students with academic material followed by factual questions; students’ responses were then fed back into the machine (Skinner, 1960). The machine provided immediate responses to each answer: the student received new material for correct answers and the same question for incorrect answers. Skinner (1960) believed that this type of programmed instruction motivated learning by breaking down concepts into small, manageable pieces of information that students could work through at their own pace while continually receiving immediate feedback on their understanding.

Computer-based learning has evolved since the advent of Skinner’s teaching machine. First, there is a range of pedagogy inherent to instructional software programs. Some computer-based tutorial and learning programs deliver drill-and-practice exercises (Hung, 2001), while other instructional software programs provide problem-solving activities that emphasize deeper understanding of mathematical concepts (Epper &
Baker, 2009; Hung, 2001; Stillson & Alsup, 2003; Twigg, 2005). As a result, technology-mediated instructional content may determine the extent to which students experience a balanced learning environment where procedural skills, conceptual understanding, and other components of mathematical proficiency are all addressed. Second, computer-based learning can be designed to incorporate principles of constructivism (Kanuka & Anderson, 1999). For example, because of its self-paced learning component, computer-based instruction is called a student-centered model of learning (Trenholm, 2006; Zhu & Polianskaia, 2007). Computer-based learning utilizes an important constructivist principle—that students are active in the construction of knowledge rather than passive recipients of knowledge, and educators serve as their guides and helpers (Kanuka & Anderson, 1999). Other essential features of a constructivist classroom are discovery-based learning and meaningful interactions between students, which can also be incorporated into computer-based instructional models (Kanuka & Anderson, 1999). Finally, the Open Learning Initiative (OLI), which creates online courses for students at Carnegie Mellon University, has demonstrated how computer-based delivery of course content can incorporate instructional elements that traditional instruction cannot. For example, the structure of the OLI-Statistics course is influenced by the theory that instructional design should try to eliminate “extraneous cognitive load” (Lovett, Meyer, & Thille, 2008, p. 6), or tasks and information that are unnecessary to learn a concept or skill. Therefore, the course explains statistics concepts through animations that are accompanied by verbal explanations so that students do not have to process separate visual and text-based explanations of statistics concepts (Lovett et al., 2008).

Computer-based learning is also a form of mastery learning (Hagerty & Smith, 2005; Trenholm, 2006). Under the mastery learning approach, course content is divided into small units, and students must demonstrate mastery of one unit before they can move on to the next unit (Kulik, Kulik, & Bangert-Drowns, 1990). The mastery learning approach is thought to be more effective than traditional instruction because it is tailored to each student’s needs; students only work on material they are ready to learn (Kulik et al., 1990). Computer-based instructional programs allow instructors to efficiently provide their students with a mastery learning experience through individualized learning.
programs that monitor student progress and adjust the content delivered accordingly (Hagerty & Smith, 2005).

**Empirical evidence.** The evidence regarding the impact of computer-based learning is inconclusive because none of the 13 studies in this set (see Table 1) employed a rigorous research design. Lovett et al. (2008) randomized students in their study on the impact of the OLI-Statistics course, but because the treatment condition is an eight-week OLI-Statistics course and the comparison condition is a 15-week traditional course, it is impossible to disentangle the effects of the OLI pedagogy from the possible effects of acceleration. In other words, the eight-week structure of the course may have contributed to the outcomes either by motivating students or through another mechanism. The highest quality study used a quasi-experimental design and found that college algebra students in course sections using ALEKS (Assessment and Learning in Knowledge Spaces), a computer-adaptive, online assessment and learning program, experienced small gains in math learning compared to students in traditional algebra course sections (Hagerty & Smith, 2005). However, the final results only include students who took both the pretest and the posttest, not accounting for the test scores of students who enrolled late or withdrew from the course. As a result, differential attrition could have biased the results.

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**Computer-Based Learning in Practice**

Cleveland State Community College redesigned its developmental and college math courses by replacing three hours per week of class time with one hour per week in a computer classroom with faculty and two hours per week in a large computer lab (Squires, Faulkner, & Hite, 2009). Students use MyMathLab to work through 10–12 curriculum modules on their own by watching an instructional video, completing homework, and then passing a quiz. Based on the mastery learning approach, to move to the next module, students must earn at least a 70% on the homework and quiz for each module. Faculty teach 10 math sections each and spend 10 hours per week in the computer lab providing students with one-on-one attention and individualized instruction. The Community College Futures Assembly awarded Cleveland State the Bellwether Award in the Instructional Programs and Services category for its redesigned math courses.
3. Research Recommendations

Evidence from this literature review supports the National Mathematics Advisory Panel’s (2008) conclusion that there is a crucial need for more methodologically rigorous scientific research in the area of effective math instructional practices. All of the pedagogical practices discussed in this review may have the potential to improve the outcomes of developmental math students, but given the poor internal validity of many of the studies, it is difficult to infer whether most of the pedagogy is effective in practice. The following are four methodological recommendations that could improve the internal validity of future research on developmental math instruction. The principal issues and patterns of findings that emerged from this review also highlight three directions for research on developmental math pedagogy.

3.1 Methodological Recommendations

Since it is difficult to conduct randomized experiments in K-12 and college settings, researchers should collect information on student abilities and demographics and control for any observable differences between groups using statistical methods. Doing so would provide more convincing evidence that differences in outcomes are due to the instructional intervention rather than preexisting differences between treatment and control students. Second, it is recommended that, if the treatment takes place across multiple classrooms, participating instructors teach both a treatment section and a control section, and that instructors be similar along observable measures of teacher quality. This would help ensure that the effects of an instructional practice can be more credibly disentangled from the impact of individual instructors.

Third, multiple-choice math tests and other standardized assessments are often used to study the effects of reform-based math instructional practices, but traditional assessments may neglect to measure the types of skills that reform-based pedagogy promotes (Hamilton et al., 2003). However, assessments that are designed specifically for a study to measure the impact of a single pedagogical practice may not be fair outcome measures if they only emphasize the skills and knowledge that were taught in the treatment classrooms. It may be most appropriate, therefore, to use multiple outcome
measures that include standardized and thoughtfully designed alternative measures of math achievement and learning.9

Finally, in higher education research, it is important to consider that even if students are unaware of which course sections have been assigned to the treatment or control group, course scheduling can influence the types of students that register for each course, and the characteristics on which these students differ may be related to educational performance. Therefore, offering treatment and control sections at similar times reduces the likelihood that any outcomes are partly determined by student characteristics related to the time of day the course sections are offered.

3.2 Directions for Future Research

Conducting rigorous evaluations of computer-based learning in developmental math is essential to furthering our understanding of how this popular developmental mathematics reform affects student math learning, persistence, and other outcomes. Anecdotally, some community colleges have experienced improved pass rates and persistence for developmental math students after the introduction of computer-based instruction and course redesign (see, e.g., Speckler, 2008; Squires et al., 2009; Twigg, 2005). But many questions remain regarding exactly how these new models of developmental education are connected to observed outcomes. Course redesign models involve substantial changes to the way course content is delivered by replacing some or all of the traditional course structure with self-paced online learning modules (Epper & Baker, 2009; Twigg, 2003). As a result, outcomes may be due to any number of changes in how course content is delivered, when students can access course content, and the pedagogy utilized in each model. For example, in some models, students are able to access course content at any time from home or in a large computer lab, while in others, they must work through the content during structured lab times (Twigg, 2003, 2005). Regarding pedagogy, there is variation in how much time students spend working

9 The midterm and final exams in Chappell’s (2006) study are examples of well-designed outcome measures. A faculty member not involved in the study designed the midterm and final that tested knowledge and skills that were covered in both the control and treatment classrooms, and six other faculty members not involved in the study assigned each item to the procedural skill subscale or conceptual understanding subscale. Then, the four instructors in the study designed a rubric and graded the exams together, ensuring that the students in the treatment and control sections were assessed fairly.
through the course material on their own, and some models emphasize individualized attention from instructors or tutors and small-group work more than others (Twigg, 2003, 2005). Differences in pedagogy also extend to the type of instructional software used (Hung, 2001): some computer-based course content may allow for investigative problem solving or discovery-based learning, while other software programs rely on drill-and-practice problems. Finally, all of these components of course redesign may impact students in different ways, and they may even have differential effects for different types of students. Future research should aim to isolate the effects of different components of course redesigns or to assess the possible differential effects of this reform on student subgroups.

Next, unlike the studies in the application and computer-based learning sets, which typically take place in colleges and universities, the studies in the other sets target diverse student populations, including elementary, secondary, developmental education, and college students as well as students with learning disabilities at each of these educational levels. Across all these sets, there are slightly larger effect sizes from high-quality studies whose target population is students with learning disabilities compared to high-quality studies whose target population is typical students, and within rigorous studies that compare outcomes between subgroups of students, effect sizes are slightly larger for lower-achieving students or students with learning disabilities. It is important to note that many of studies focusing on students with learning disabilities are by the same set of authors (i.e., Fuchs et al.). Nonetheless, this pattern may be indicative of the importance of pedagogy that utilizes cooperative learning, teaches students to monitor their understanding as they solve problems, improves problem representation, and involves ongoing assessment and the adjustment of instruction for students struggling with mathematics. Therefore, a direction for qualitative and quantitative research could

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10 For example, in a randomized study, Campuzano, Dynarski, Agodini, and Rall (2009) compared the effects of different software products (PLATO, Larson, and Cognitive Tutor) on middle school math achievement. PLATO is described as relatively behaviorist because it includes only independent practice on procedural skill building, while the Larson products address both skill building and problem solving, and Cognitive Tutor requires students to use graphs to represent and solve problem scenarios. None of the products had significant effects on student math achievement, and standard errors were large, such that one cannot say with confidence that their effects were negative, zero, or positive. However, this study still presents a model for research that should be performed at the higher education level.
be a more focused examination of how these types of pedagogy could be effective in building the foundational skills that adult students need to move beyond basic math and into more advanced math subjects.

A final priority for developmental education research is designing and investigating the impact of more balanced instructional approaches that promote all strands of mathematical learning. This is especially important since the Mathematical Association of America (MAA) and American Mathematical Association of Two-Year Colleges (AMATYC) recommend replacing traditional college algebra courses with modeling-based college algebra courses, in which students solve problems situated in real-world contexts by creating and interpreting mathematical models (Katz, 2007). However, while the studies in the application set do not suggest anything conclusive about the effects of this type of instruction, they do consistently suggest that application-oriented instructional approaches may support some strands of mathematical proficiency but do not improve procedural fluency. A challenge for researchers and practitioners is to develop modeling-based approaches that improve students’ math understanding as well as their performance on traditional standardized tests of mathematics achievement.

4. Instructional Recommendations

There are a number of studies in the student collaboration and problem representation sets that employed rigorous designs with positive results, and, therefore, adaptation and evaluation of these pedagogical practices ought to be considered for the developmental mathematics classroom.

4.1 Structured Student Collaboration

Structured peer-collaboration methods for developmental and college math students are already taking place outside the classroom with programs like Peer-Led Team Learning (Hooker, 2010) and Math Excel, workshops where students work together collaboratively on math problems that reinforce or review material that is covered in their regular course (Dick, 2003). However, it is unknown how prevalent highly structured peer-collaboration methods are in the developmental math classroom.
Many instructors may use cooperative learning in informal ways, but theory and research suggest that cooperative learning may not be effective unless it is formally and systematically integrated into a course. According to social interdependence theory, positive educational outcomes are the result of engagement in frequent, meaningful interactions with others for the purpose of working toward a common goal (Johnson et al., 1991), and the rigorous student collaboration studies found that students benefited from cooperative learning methods in which all students played a role in working toward a shared goal.

Applications of structured student collaboration in developmental math include collaborative problem-solving activities that have a group grade tied to them. Part of the final grade in a course may even include group performance on collaborative activities. A specific example of a more formal student collaboration activity comes from Dees’s (1991) study. In the developmental math lab sections, groups of four to six students received only parts of the instructions to a problem, and then students shared with their group the information they received. The group had to work together to understand the problem instructions and then solve the problem. At the end of the activity, one group member was randomly chosen to explain the group’s solution, and the group’s grade was based on this explanation, so group members had to collaborate to ensure everyone in the group understood the solution steps and final answer.

Activities like the one from Dees’s classroom—those that ensure that each student has a role in accomplishing a task with a group grade—could be used to supplement more traditional instructional practices in the developmental math classroom and used in combination with other alternative pedagogical practices. For instance, the use of ongoing assessment can help determine the specific areas where students need more practice, so instead of conducting a whole-class review of the material, an instructor could group students together to work on only the specific areas with which they are struggling. Requiring students to explain out loud how they arrived at their solution may help them start thinking about their own mathematical thinking, thereby incorporating a metacognitive framework into their problem-solving process. Exercises could also require students to represent the problem situation in several ways in order to develop their problem representation skills.
4.2 Improving Problem Representation

There were no developmental education studies that focused on problem representation, but rigorous studies involving other student populations demonstrate how instructors can improve student learning by integrating problem representation instruction into their lectures, interactive board work, and other traditional modes of instruction. For example, in a study by Brenner et al. (1997), pre-algebra students were taught and asked to represent problems using graphs, diagrams, tables, pictures, and equations and to solve problems using multiple representations. Similarly, in a study by Chappell (2006), faculty routinely represented calculus concepts numerically, algebraically, and graphically and solved them using these representations in their lectures, and students were expected to do the same on homework and assessments. Evidence from both of these studies suggests that improving students’ problem representation skills is a promising teaching strategy for improving math learning outcomes.

Developmental math instructors may want to consider modeling problem situations numerically, algebraically, and graphically in their lessons and expecting their students to represent and solve problems in multiple ways on homework and assessments. This would require more time devoted to lesson preparation, a change in the content of homework and assessments, and lessons that spend more time on each concept, which may reduce the time spent working on procedural fluency through solving equations (Brenner et al., 1997). It would be useful for researchers to design and evaluate balanced instructional approaches that are able to effectively teach all strands of mathematical proficiency, but individual instructors can also experiment with how to find ways to focus on problem representation while still providing students with practice on traditional equation solving.

5. Summary of Recommendations

To summarize, identifying effective pedagogical practices in developmental math could potentially lead to improved student learning outcomes and, ultimately, improved rates of course completion and persistence. However, more rigorous research in the area of developmental math education is needed in order to confirm that certain practices that
seem promising are indeed effective in the classroom. First, evaluations of course redesign in developmental mathematics should attempt to separate the effects of the structural and instructional components of the various models of computer-based learning, examine how different types of students respond to reform, and consider the possible differential impact of instructional software that emphasizes procedural fluency and software that emphasizes mathematical understanding and application. Future research should also explore how cooperative learning, ongoing formative assessment, and strategies that encourage self-reflection and problem representation skills help developmental education students build foundational math skills. Finally, research should develop and test balanced instructional methods that have an impact on all strands of mathematical proficiency.

In the meantime, the literature yields support for a few recommendations that instructors may find immediately useful. For example, instructors should consider using structured collaborative problem-solving activities in which each group member has a role in working toward a group product or answer. Second, instructors should consider representing the same problem numerically, graphically, and algebraically in their lessons on a routine basis. Students can then be expected to represent problems in multiple ways on in-class exercises, homework, and assessments.

Currently, the academic outlook for students who enroll in developmental math courses is generally unfavorable. Improving outcomes for developmental math students will require the continued efforts of researchers and practitioners. The payoff for those efforts may be significant, since bringing more effective pedagogy to the developmental math classroom could have profound effects on academic outcomes and job attainment for developmental math students.
References


32


## Table 1
### Review of Math Pedagogy Studies

<table>
<thead>
<tr>
<th>Study and Design¹</th>
<th>Target Students</th>
<th>Summary of Findings</th>
<th>Effect Size²</th>
<th>Effect Category³</th>
<th>Common Empirical Flaws⁴</th>
<th>No Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K-8 High School Developmental Education College Level</td>
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<tr>
<td><strong>Student Collaboration</strong></td>
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<tr>
<td>Baxter, Woodward, &amp; Olson (2001)</td>
<td>X</td>
<td>Whole-class discussions were difficult for the low-achieving students to follow, but these students were more engaged during pair work, especially when they worked with an average or high-ability peer. However, close observation of pair work interactions revealed low-achieving students primarily copying their partner’s work or managing the materials.</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Beirne-Smith (1991)</td>
<td>X</td>
<td>Students with disabilities who were randomly assigned to work with peer tutors using two different instructional methods performed better on an addition facts assessment than the control group.</td>
<td>0.75</td>
<td>Moderate positive</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Calhoon &amp; Fuchs (2003)</td>
<td>X</td>
<td>PALS and CBM show promise for improving the computational skills of secondary students with disabilities. However, since the PALS and CBM interventions were implemented in combination, it is impossible to attribute the outcomes strictly to CBM.</td>
<td>-0.29 to 0.40</td>
<td>Trivial negative to small positive</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

¹Study and Design: K-8 = Kindergarten to Grade 8, High School = Secondary School, Developmental Education = Special Education, College Level = University Level

²Effect Size

³Effect Category: Trivial, Small, Moderate, Large

⁴Common Empirical Flaws: Student Design Non-Equivalent, Teacher Design Non-Equivalent, Possible Attrition Issues
<table>
<thead>
<tr>
<th>Study and Design¹</th>
<th>Target Students</th>
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<tbody>
<tr>
<td></td>
<td>K-8</td>
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<tr>
<td>Dees (1991)</td>
<td>X</td>
<td>Students in the cooperative learning sections performed significantly better on the algebra word problem and geometry proof-writing sections than students in the traditional sections.</td>
<td>0.39 to 0.56</td>
<td>Small positive</td>
<td>X</td>
</tr>
<tr>
<td>DePree (1998)</td>
<td>X</td>
<td>Latino and female students in cooperative learning classes had positive gains in self-reported math confidence relative to the control group, but there were no differences in the achievement gains of treatment and control groups.</td>
<td>0.45 to 0.72</td>
<td>Small to moderate positive</td>
<td>X X X</td>
</tr>
<tr>
<td>Duncan &amp; Dick (2000)</td>
<td>X</td>
<td>The Math Excel students attained significantly higher grades than the non-Math Excel students, and students in the Math Excel Program outperformed their predicted grades, as determined by their SAT Math score, by half a grade point.</td>
<td>N/A</td>
<td>Moderate positive</td>
<td>X X X</td>
</tr>
<tr>
<td>Fuchs et al. (1995)</td>
<td>X</td>
<td>Students with disabilities and average-achieving students in the PALS groups outperformed control group students on operations and application tests, while low-achieving students outperformed their counterparts only on the math operations test.</td>
<td>0.07 to 0.95</td>
<td>Trivial to moderate positive</td>
<td></td>
</tr>
<tr>
<td>Fuchs et al. (1997)</td>
<td>X</td>
<td>Students with disabilities and low-achieving students in the peer mediated instruction (PMI) groups outperformed their peers in the control group, and when tasks that emphasized understanding were added to the PMI treatment, both average- and high-achieving students made greater gains than their counterparts in the control group.</td>
<td>0.18 to 1.15</td>
<td>Trivial to moderate positive</td>
<td></td>
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<tr>
<td>Study and Design¹</td>
<td>Target Students</td>
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<td>Effect Size²</td>
<td>Effect Category³</td>
<td>Common Empirical Flaws⁴</td>
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<td>K-8</td>
<td>High School</td>
<td>Developmental Education</td>
<td>College Level</td>
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<tr>
<td>Fuchs et al. (2001)</td>
<td>X</td>
<td>Medium- and low-achieving students and students with disabilities in the peer-assisted learning strategies (PALS) group outperformed the control group, but growth was higher for high-achieving control group students than high-achieving PALS students.</td>
<td>-0.20 to 0.53</td>
<td>Small negative to small positive</td>
<td></td>
</tr>
<tr>
<td>Ginsburg-Block &amp; Fantuzzo (1998)</td>
<td>X</td>
<td>Peer collaboration methods had a positive impact on the computational and word problem skills, academic motivation, and self-concept of third- and fourth-grade students. (Peer collaboration and problem solving methods were not significantly more effective in combination than implemented separately.)</td>
<td>0.29 to 0.36</td>
<td>Small positive</td>
<td></td>
</tr>
<tr>
<td>Hooker (2010)</td>
<td>X</td>
<td>Students in pre-algebra classes that used peer-led team leader (PLTL) workshops had higher persistence and completion rates than control group students.</td>
<td>N/A</td>
<td>Trivial to small positive</td>
<td>X</td>
</tr>
<tr>
<td>Karper &amp; Melnick (1993)</td>
<td>X</td>
<td>There were no significant differences between students using Team Accelerated Instruction and students in comparison classrooms at any grade level on scores of math aptitude, concepts, and computations.</td>
<td>0.00</td>
<td>Trivial positive</td>
<td></td>
</tr>
<tr>
<td>Keynes &amp; Olson (2000)</td>
<td>X</td>
<td>Students in the Calculus Initiative classrooms had higher GPAs, pass rates, and retention rates than students in traditional calculus.</td>
<td>N/A</td>
<td>Small positive</td>
<td>X</td>
</tr>
<tr>
<td>Study and Design¹</td>
<td>Target Students</td>
<td>Summary of Findings</td>
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<td></td>
<td>K-8 High School Developmental Education College Level</td>
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<tr>
<td>Norwood (1995)</td>
<td>X</td>
<td>Compared to students who took Developmental Algebra in the semester when instructors used traditional methods, a higher proportion of students who took Developmental Algebra in the semester that the instructors used the Learning Model of cooperative learning completed their first college-level math course.</td>
<td>N/A</td>
<td>Small positive</td>
<td>X</td>
</tr>
<tr>
<td>Summers &amp; Svinicki (2007)</td>
<td>X</td>
<td>Students in the cooperative learning classrooms reported significantly more motivation for mastery and perceived more interactive learning and classroom community but reported significantly less performance motivation than students in the traditional classrooms.</td>
<td>-0.65 to 0.37</td>
<td>Moderate to small positive</td>
<td>X X X</td>
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<tr>
<td>Metacognition</td>
<td></td>
<td></td>
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<tr>
<td>Abdalkhani &amp; Menon (1998)</td>
<td>X X</td>
<td>In earlier courses in which journal writing was not used in math, students had a mean score of 65% on quizzes, while students in the course that incorporated journal writing had a mean quiz score of 72%.</td>
<td>N/A</td>
<td>Trivial positive</td>
<td>X X</td>
</tr>
<tr>
<td>Hiebert &amp; Wearne (1993)</td>
<td>X</td>
<td>The opportunity for students to explain, describe, and question their learning contributed to higher gains in achievement in classrooms that used classroom discourse versus classrooms that did not.</td>
<td>0.5 to 1.5</td>
<td>Moderate to large positive</td>
<td>X</td>
</tr>
</tbody>
</table>

¹: Study and Design: K-8 High School Developmental Education College Level
²: Effect Size: N/A
³: Effect Category: Small positive
⁴: Common Empirical Flaws: Student Design Non-Equivalent Teacher Design Non-Equivalent Possible Attrition Issues No Comparison Group

53
<table>
<thead>
<tr>
<th>Study and Design¹</th>
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<th>Summary of Findings</th>
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<th>Common Empirical Flaws⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hohn &amp; Frey (2002)</td>
<td>X K-8 High School</td>
<td>The SOLVED method, which stands for &quot;state the problem, options to use, links to the past, visual aid, execute your answer, and do check back,&quot; had a positive impact on third-, fourth-, and fifth-grade students' math performance compared to control group students.</td>
<td>0.45 to 0.93</td>
<td>Small to moderate positive</td>
<td>X</td>
</tr>
<tr>
<td>Porter (1996)</td>
<td>X College Level</td>
<td>There were no differences in the number of procedural errors made by students in a college calculus course that used writing to learn math and students in a comparison course on a final exam, but students in the treatment group made more conceptual errors.</td>
<td>-0.63 to 0.09</td>
<td>Moderate negative to trivial positive</td>
<td>X X</td>
</tr>
<tr>
<td>Pugalee (2001)</td>
<td>X Qualitative</td>
<td>A metacognitive framework emerged in high school students' writings about their problem-solving processes.</td>
<td>N/A</td>
<td>N/A</td>
<td>X</td>
</tr>
<tr>
<td>Pugalee (2004)</td>
<td>X Qualitative</td>
<td>Writing their problem solving process was more beneficial for a group of 20 high school math students than verbalizing their problem-solving process.</td>
<td>N/A</td>
<td>N/A</td>
<td>X</td>
</tr>
<tr>
<td>Schurter (2002)</td>
<td>X</td>
<td>Students who received direct instruction in the use of comprehension monitoring or Polya's four-step problem-solving method performed better in mathematical problem solving than those who did not.</td>
<td>N/A</td>
<td>Small positive</td>
<td>X</td>
</tr>
<tr>
<td>Tournaki (2003)</td>
<td>X</td>
<td>Students with and without learning disabilities who received strategy instruction in verbalizing the problem-solving process improved much more on an addition facts test than students who received drill-and-practice instruction.</td>
<td>0.10 to 1.58</td>
<td>Trivial to large positive</td>
<td></td>
</tr>
</tbody>
</table>

¹ The study and design information is provided for each study. ² Effect size is reported where available. ³ Effect category reflects the magnitude of the effect. ⁴ Possible attrition and no comparison group issues are noted.
<table>
<thead>
<tr>
<th>Study and Design(^1)</th>
<th>Target Students</th>
<th>Summary of Findings</th>
<th>Effect Size(^2)</th>
<th>Effect Category(^3)</th>
<th>Common Empirical Flaws(^4)</th>
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<tbody>
<tr>
<td></td>
<td>K-8</td>
<td>High School</td>
<td>Developmental Education</td>
<td>College Level</td>
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<tr>
<td>Problem Representation</td>
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<tr>
<td>Brenner et al. (1997)</td>
<td>X</td>
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<tr>
<td>Chappell (2006)</td>
<td></td>
<td></td>
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<td>X</td>
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<tr>
<td>Fuson &amp; Briars (1990)</td>
<td>X</td>
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<tr>
<td>Jitendra et al. (1998)</td>
<td>X</td>
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<tr>
<td>Jitendra et al. (2009)</td>
<td>X</td>
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</table>

**Summary:**

- **Pre-algebra students** who received instruction in problem representation were better able to create and apply multiple representations than control students at significant levels, but the control students did significantly better on a test of symbol-manipulation skills.
- **Students in the concept-based calculus sections** scored significantly better on the midterm and final exams than the students in the traditional sections, except for on the final procedural skill section.
- The addition and subtraction performance of the second graders in learning/teaching approach classrooms was above that reported for typical third graders.
- Elementary students with or at risk for mild learning disabilities who received schema-based instruction, direct instruction in using schematic diagrams and multiple solution strategies, improved their word problem performance more than students in the control group.
- A diverse group of high- and low-ability students who received schema-based instruction improved their understanding of ratio and proportion more than the control group.
<table>
<thead>
<tr>
<th>Study and Design¹</th>
<th>Target Students</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K-8 High School</td>
<td>Developmental Education</td>
<td>College Level</td>
<td>Test performance and number of students eligible for ninth-grade algebra increased, and QUASAR students performed significantly better on NAEP compared to a similar sample of urban, low-SES students.</td>
<td>N/A</td>
</tr>
<tr>
<td>Silver &amp; Stein (1996)</td>
<td>X</td>
<td>X</td>
<td>Non-Equivalent</td>
<td></td>
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<tr>
<td>Descriptive</td>
<td></td>
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<tr>
<td>Stein, Grover, &amp; Henningsen (1996)</td>
<td>X</td>
<td>X</td>
<td>Non-Equivalent</td>
<td>QUASAR students were observed using multiple strategies and representations to solve and explain their solutions but had difficulty maintaining a high level of cognitive processing during many of the challenging tasks.</td>
<td>N/A</td>
</tr>
<tr>
<td>Qualitative</td>
<td></td>
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</tr>
<tr>
<td>Witzel et al. (2003)</td>
<td>X</td>
<td>X</td>
<td>Non-Equivalent</td>
<td>Students with disabilities and at-risk students who received concrete-representational-abstract instruction showed greater improvements in their performance on single- and multiple-variable algebra equations than similar students receiving traditional instruction.</td>
<td>0.52 to 0.87</td>
</tr>
<tr>
<td>Zawaiza &amp; Gerber (1993)</td>
<td>X</td>
<td>X</td>
<td>Non-Equivalent</td>
<td>Community college students with learning disabilities who received a schema-based intervention made greater gains on a word problem test than those who did not, and they performed at almost the same level as their math-competent peers.</td>
<td>0.27 to 1.11</td>
</tr>
<tr>
<td>Application</td>
<td></td>
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</tr>
<tr>
<td>Bottge et al. (2001)</td>
<td>X</td>
<td>X</td>
<td>Non-Equivalent</td>
<td>The students in the remedial Enhanced Anchored Instruction (EAI) class matched the performance of students in the pre-algebra classes on the problem-solving and maintenance test but not on the computation test.</td>
<td>N/A</td>
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</tbody>
</table>

¹ Study and Design: K-8, High School, Developmental Education, College Level
² Effect Size: N/A, 0.27 to 1.11, 0.52 to 0.87
³ Effect Category: N/A, Small to moderate positive, Small to large positive
⁴ Common Empirical Flaws: Student Design Non-Equivalent, Teacher Design Non-Equivalent, Possible Attrition Issues, No Comparison Group
<table>
<thead>
<tr>
<th>Study and Design&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Target Students</th>
<th>Summary of Findings</th>
<th>Effect Size&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Effect Category&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Common Empirical Flaws&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K-8 High School</td>
<td>Developmental Education College Level</td>
<td></td>
<td></td>
<td>Student Design Non-Equivalent Teacher Design Non-Equivalent Possible Attrition Issues No Comparison Group</td>
</tr>
<tr>
<td>Botte et al. (2002)</td>
<td>X</td>
<td>Students in classrooms using EAI performed better than the group receiving traditional instruction on a video problem test but not on a computation and word problem test.</td>
<td>0.11 to 0.86</td>
<td>Trivial to moderate positive</td>
<td>X</td>
</tr>
<tr>
<td>Brenner (1998)</td>
<td>X</td>
<td>Native Hawaiian kindergarten students exposed to culturally responsive math instruction for a year performed better, on average, on the standardized math assessment than kindergarten students in the same class the year before.</td>
<td>N/A</td>
<td>Small</td>
<td>X</td>
</tr>
<tr>
<td>Ellington (2005a)</td>
<td>X</td>
<td>Students in modeling sections had higher levels of self-reported confidence, lower levels of anxiety, and lower withdrawal rates than students in traditional sections.</td>
<td>N/A</td>
<td>Trivial to small positive</td>
<td>X</td>
</tr>
<tr>
<td>Ellington (2005b)</td>
<td>X</td>
<td>Students in modeling sections performed significantly better on an assessment and had higher pass rates than students in traditional sections.</td>
<td>0.41</td>
<td>Small positive</td>
<td>X</td>
</tr>
<tr>
<td>Ganter &amp; Jiroutek (2000)</td>
<td>X</td>
<td>Calculus sections that utilized long-term projects in the computer lab did not perform better than the control sections on the final exam. On the standardized exam the control group outperformed the treatment group.</td>
<td>N/A</td>
<td>Trivial negative</td>
<td>X</td>
</tr>
<tr>
<td>Hickey, Moore, &amp; Pelligrino (2001)</td>
<td>X</td>
<td>From third to fifth grade, students in the reform-oriented Jasper videodisc classrooms had the largest gains on the problem-solving and conceptual sub-tests and the largest decline on the computation sub-test, compared to students in comparison classrooms and non-reform-oriented treatment classrooms.</td>
<td>N/A</td>
<td>Trivial negative to trivial positive</td>
<td></td>
</tr>
<tr>
<td>Study and Design¹</td>
<td>Target Students</td>
<td>Summary of Findings</td>
<td>Effect Size²</td>
<td>Effect Category³</td>
<td>Common Empirical Flaws⁴</td>
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<tr>
<td>Hollar &amp; Norwood (1999)</td>
<td>K-8 High School Developmental Education College Level</td>
<td>Scores on the function test were higher for the graphing-approach group than for the control group, but there were no significant differences in terms of final exam scores (scores not reported).</td>
<td>1.02</td>
<td>Large positive</td>
<td>X X</td>
</tr>
<tr>
<td>Lipka &amp; Adams (2004)</td>
<td>K-8 High School Developmental Education College Level</td>
<td>Teachers were randomly assigned to use culturally relevant pedagogy or traditional instruction with their sixth-grade Yu’pik students, and students in the treatment classrooms had higher gains in understanding the concepts of perimeter and area than students in the control group.</td>
<td>0.44 to 0.63</td>
<td>Small to moderate positive</td>
<td>X</td>
</tr>
<tr>
<td>O’Callaghan (1998)</td>
<td>K-8 High School Developmental Education College Level</td>
<td>The Computer-Intensive Algebra students scored higher than students in the traditional algebra classrooms on the function test, and there were no significant differences in final exam performance (scores not reported).</td>
<td>0.86 to 1.07</td>
<td>Large positive</td>
<td>X X</td>
</tr>
<tr>
<td>Vasquez (2004) Descriptive</td>
<td>K-8 High School Developmental Education College Level</td>
<td>A greater percentage of students passed higher level math courses after the introduction of the Algorithmic Instructional Technique.</td>
<td>N/A</td>
<td>Trivial to small positive</td>
<td>X X</td>
</tr>
<tr>
<td>Understanding Student Thinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adams (1997) Qualitative</td>
<td>K-8 High School Developmental Education College Level</td>
<td>The introduction of graphing calculators into the classroom improved an instructor’s assessment methods and understanding of student learning.</td>
<td>N/A</td>
<td>N/A</td>
<td>X</td>
</tr>
</tbody>
</table>

¹Study and Design: K-8, High School, Developmental Education, College Level
²Effect Size: 1.02, 0.44 to 0.63, 0.86 to 1.07, N/A
³Effect Category: Large positive, Small to moderate positive, Large positive, Trivial to small positive
⁴Common Empirical Flaws: Student Design Non-Equivalent, Teacher Design Non-Equivalent, Possible Attrition Issues, No Comparison Group

58
<table>
<thead>
<tr>
<th>Study and Design</th>
<th>Target Students</th>
<th>Summary of Findings</th>
<th>Effect Size</th>
<th>Effect Category</th>
<th>Common Empirical Flaws</th>
<th>Student Design Non-Equivalent</th>
<th>Teacher Design Non-Equivalent</th>
<th>Possible Attrition Issues</th>
<th>No Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allinder et al. (2000)</td>
<td>X</td>
<td>Students with disabilities performed better on a test of computational ability in a classroom where teachers used curriculum-based measurement (CBM) plus self-monitoring of their instructional practices than students of teachers who only used CBM, and both treatment groups performed better than the control group.</td>
<td>0.35 to 0.92</td>
<td>Small to moderate positive</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Boylan &amp; Saxon (1998)</td>
<td>X</td>
<td>Institutions with exceptional developmental education programs based on observation and developmental education pass rates reported using frequent testing in their developmental education classrooms.</td>
<td>N/A</td>
<td>N/A</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>Calhoon &amp; Fuchs (2003)</td>
<td>X</td>
<td>PALS and CBM show promise for improving the computational skills of secondary students with disabilities. However, since the PALS and CBM interventions were implemented in combination, it is impossible to attribute the outcomes strictly to CBM.</td>
<td>-0.29 to 0.40</td>
<td>Trivial negative to small positive</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Fabry et al. (1997)</td>
<td>X</td>
<td>Students self-reported that the classroom assessment technique improved their perceptions and attitudes about learning.</td>
<td>N/A</td>
<td>N/A</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>Fuchs &amp; Fuchs (1990)</td>
<td>X</td>
<td>Students with disabilities who had teachers who used CBM and skills analysis (which allows teachers to analyze proficiency in specific skills) performed somewhat better on a computation test than students with disabilities whose teachers used only CBM, and both treatment groups outperformed the control group.</td>
<td>0.28 to 0.67</td>
<td>Small positive</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Study and Design&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>Effect Category&lt;sup&gt;3&lt;/sup&gt;</td>
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<td></td>
<td>Student Design Non-Equivalent</td>
<td>Teacher Design Non-Equivalent</td>
<td>Possible Attrition Issues</td>
<td>No Comparison Group</td>
<td></td>
</tr>
<tr>
<td>Fuchs et al. (1991)</td>
<td>X</td>
<td>Students with disabilities who had teachers who used CBM with expert instructional recommendations made greater gains on an operations test than students in the control group.</td>
<td>0.84 to 0.94</td>
<td>Moderate positive</td>
<td></td>
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</tr>
<tr>
<td>Fuchs et al. (1994)</td>
<td>X</td>
<td>Students with disabilities who had teachers who used CBM with instructional recommendations made slightly greater gains on an operations test than students with disabilities whose teachers used only CBM, and both treatment groups outperformed the control group.</td>
<td>0.16 to 0.43</td>
<td>Trivial to small positive</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Nunnery &amp; Ross (2007)</td>
<td>X</td>
<td>Students in Accelerated Math (AM) classrooms did significantly better on standardized assessments than students in comparison classrooms.</td>
<td>0.17 to 0.22</td>
<td>Trivial to small positive</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Siadat et al. (2008)</td>
<td>X</td>
<td>Students in the Keystone Method classes had higher final exam scores and persistence rates than students in control classes.</td>
<td>N/A</td>
<td>Small to large positive</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Villasenor &amp; Kepner (1993)</td>
<td>X</td>
<td>Students in the cognitively guided instruction classrooms outperformed students in the control classrooms.</td>
<td>3.55 to 5.44</td>
<td>Very large to nearly perfect positive</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ysseldyke &amp; Bolt (2007)</td>
<td>X</td>
<td>AM classrooms performed significantly better on the STAR Math test compared to control classrooms, but there were no significant differences between the two groups in Terra Nova performance.</td>
<td>0.37</td>
<td>Small positive</td>
<td>X</td>
<td></td>
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</tbody>
</table>

<sup>1</sup>Study and Design: K-8 High School Developmental Education College Level

<sup>2</sup>Effect Size: 0.84 to 0.94

<sup>3</sup>Effect Category: Moderate positive

<sup>4</sup>Common Empirical Flaws: Student Design Non-Equivalent Teacher Design Non-Equivalent Possible Attrition Issues No Comparison Group
<table>
<thead>
<tr>
<th>Study and Design¹</th>
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<th>Common Empirical Flaws⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ysseldyke &amp; Tardrew (2007)</td>
<td>K-8 X High School Developmental Education College Level</td>
<td>AM third- to sixth-grade classrooms performed significantly better on standardized assessments than comparison classrooms. There were no significant findings for seventh- to tenth-grade classrooms.</td>
<td>0.18 to 0.57</td>
<td>Trivial to small positive</td>
<td>X</td>
</tr>
</tbody>
</table>

**Computer-Based Learning**

<table>
<thead>
<tr>
<th>Study and Design¹</th>
<th>Target Students</th>
<th>Summary of Findings</th>
<th>Effect Size²</th>
<th>Effect Category³</th>
<th>Common Empirical Flaws⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garcia (2003)</td>
<td>X X</td>
<td>Pre- to post-test mean ACCUPLACER scores increased for students in an elementary algebra class with learning style and attitude surveys, workshops, computer-based instruction, self-assessment, and supplemental instruction.</td>
<td>N/A</td>
<td>Small positive</td>
<td>X X</td>
</tr>
<tr>
<td>Hagerty &amp; Smith (2005)</td>
<td>X X</td>
<td>The students using ALEKS had higher gains from pre- to post-test than the students in the traditional classrooms.</td>
<td>0.49</td>
<td>Small positive</td>
<td>X</td>
</tr>
<tr>
<td>Lovett et al. (2008)</td>
<td>X X</td>
<td>Students randomly assigned to an eight-week accelerated OLI-Statistics hybrid course (in which students met with the instructor to review and reinforce material) performed better on the final exam than students randomly assigned to the traditional 15-week statistics course.</td>
<td>N/A</td>
<td>Small positive</td>
<td>X X</td>
</tr>
<tr>
<td>McClendon &amp; McArdle (2002)</td>
<td>X X</td>
<td>Retention was higher in the lecture mode of instruction versus ALEKS and Academic Systems.</td>
<td>N/A</td>
<td>Trivial to moderate negative</td>
<td>X X X</td>
</tr>
<tr>
<td>O'Dwyer et al. (2007)</td>
<td>X X</td>
<td>Algebra students in eighth and ninth grade using a hybrid online learning model scored slightly higher on an algebra test at the end of the year.</td>
<td>0.13</td>
<td>Trivial Positive</td>
<td>X</td>
</tr>
<tr>
<td>Study and Design</td>
<td>Target Students</td>
<td>Summary of Findings</td>
<td>Effect Size</td>
<td>Effect Category</td>
<td>Common Empirical Flaws</td>
</tr>
<tr>
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<td>------------------------</td>
</tr>
<tr>
<td>Speckler (2008)</td>
<td>K-8 High School</td>
<td>At 18 colleges, retention and pass rates, course enrollments, and/or grades were generally higher for students in sections that used MyMathLab or MathXL, with a few exceptions.</td>
<td>N/A</td>
<td>Small to moderate positive</td>
<td>Non-Equivalent</td>
</tr>
<tr>
<td>Squires et al. (2009)</td>
<td>X</td>
<td>At Cleveland State Community College, after the introduction of a course redesign model, course completion rates in developmental math and subsequent college-level math courses increased.</td>
<td>N/A</td>
<td>Small</td>
<td>Non-Equivalent</td>
</tr>
<tr>
<td>Stillson &amp; Alsup (2003)</td>
<td>X</td>
<td>A higher percentage of students failed the course in the semester that ALEKS was introduced than in previous semesters. Students in the study reported that ALEKS in combination with group work, the lectures, and individual assistance from the instructor was helpful in learning algebra.</td>
<td>N/A</td>
<td>Trivial to small negative</td>
<td>N/A</td>
</tr>
<tr>
<td>Taylor (2008)</td>
<td>X</td>
<td>The control group made larger gains from pre- to post-test than the ALEKS group on the algebra test, but self-reported math anxiety decreased more for the ALEKS group than for the control group, and self-reported attitudes about math improved for the ALEKS group and worsened for the control group.</td>
<td>-0.21 to -0.12</td>
<td>Small negative</td>
<td>N/A</td>
</tr>
<tr>
<td>Twigg (2005)</td>
<td>X</td>
<td>Different outcomes were examined at 30 selected institutions, with in-depth case studies on 15 institutions. Colleges that redesigned their math courses reported increases in retention, math learning, and course pass rates and decreased cost per student.</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Study and Design</td>
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<tr>
<td>Waycaster (2001) Qualitative/Descriptive</td>
<td>X</td>
<td>The success rates in 15 developmental math courses were not related to the method of instruction (lecture or Computer-Aided Instruction).</td>
<td>N/A</td>
<td>Trivial negative</td>
<td>X X</td>
</tr>
<tr>
<td>Zavarella &amp; Ignash (2009)</td>
<td>X</td>
<td>20% of students in the lecture-based course, 42% of students in the hybrid course, and 39% of students in the online course withdrew.</td>
<td>N/A</td>
<td>Small negative</td>
<td>X X</td>
</tr>
<tr>
<td>Zhu &amp; Polianskaia (2007)</td>
<td>X</td>
<td>Over most years in a ten year period, a higher percentage of students in lecture courses had higher pass rates, course completion rates, and final exam scores than students in computer-mediated courses.</td>
<td>N/A</td>
<td>Trivial to small negative</td>
<td>X X</td>
</tr>
</tbody>
</table>

Notes 1-4 appear on the next page.
Table 1 Notes

1. Study and Design

Unless otherwise noted, the study is a quantitative study that used a quasi-experimental or randomized design. Descriptive studies usually did not utilize comparison groups but reported frequency outcomes of students in existing programs. Qualitative studies usually involved observation of students in some program or instructional environment, and most did not utilize a comparison group.

2. Effect Size

Effect sizes are used to compare results across studies with different outcome measures and are also important in measuring meaningful changes in outcomes that may not necessarily be statistically significant. The table reports Cohen’s $d$ effect sizes, which can be interpreted as the standardized difference between the treatment and control group means. A positive $d$ indicates that the treatment group had superior outcomes; a negative $d$ indicates that the comparison group had superior outcomes. When $d$ was not reported in a given paper, the effect size was calculated using means and standard deviations for the treatment and control groups as provided in the article, using the following formula, where $x$ is the mean, $n$ is the sample size, $s$ is the standard deviation, and the subscripts $t$ and $c$ denote treatment and control:

$$d = \frac{\bar{x}_t - \bar{x}_c}{\sqrt{\frac{(n_t-1)s_t^2 + (n_c-1)s_c^2}{n_t+n_c}}}$$

If the means and/or standard deviations were not provided but the $F$-statistic was, Cohen’s $d$ was calculated using $F$ and the sample sizes of the treatment and control groups:

$$d = \sqrt{F\left(\frac{n_t+n_c}{n_tn_c}\right)\left(\frac{n_t+n_c}{n_t+n_c-2}\right)}$$
3. Effect Category

For articles that do not report the information to necessary calculate Cohen’s $d$, “N/A” is written in the effect size column. However, some of these articles report group percentages or correlations that allow for an estimation of their effect size category. Hopkins (2009) proposes a scale that can be used to compare traditional effect size estimates to differences in percentages. The following scale was used to compare effect size estimates across various types of effects, in order to categorize them by size:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Trivial</th>
<th>Small</th>
<th>Moderate</th>
<th>Large</th>
<th>Very Large</th>
<th>Nearly Perfect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation coefficient ($r$)</td>
<td>0–0.1</td>
<td>0.1–0.3</td>
<td>0.3–0.5</td>
<td>0.5–0.7</td>
<td>0.7–0.9</td>
<td>0.9–1.0</td>
</tr>
<tr>
<td>Standardized difference in means ($d$)</td>
<td>0–0.2</td>
<td>0.2–0.6</td>
<td>0.6–1.2</td>
<td>1.2–2.0</td>
<td>2.0–4.0</td>
<td>4.0–∞</td>
</tr>
<tr>
<td>Percentage difference</td>
<td>0–10</td>
<td>10–30</td>
<td>30–50</td>
<td>50–70</td>
<td>70–90</td>
<td>90–100</td>
</tr>
</tbody>
</table>


Four common methodological flaws were identified across the studies. Studies that did not have any of these flaws are considered rigorous. Below is an explanation of each empirical flaw.

**Student design non-equivalent.** The most common weakness, especially of the quantitative studies whose target population is developmental or college-level students, is a non-equivalent student design. Most of these studies allowed students to self-select into treatment and control groups but neglected to collect pre-treatment ability and demographic information on the student participants. As a result, any significant differences in outcomes could be due to the preexisting differences between the treatment and control students rather than the instructional intervention. Another common research design is to compare the outcomes of students who received the treatment to the outcomes of students from previous years or semesters, when traditional instructional practices were in use. However, this comparison introduces time-varying characteristics that are not controlled for and, therefore, could explain any differences in outcomes. Other studies do collect pretreatment information but do not use it to conduct a rigorous analysis of group equivalence. For example, these studies do not adjust post-treatment
test performance for pre-treatment test performance, or they do not test for statistical differences between treatment and control group pre-test scores. Finally, some articles do not report pre-test scores, but the author claims that they revealed no significant differences between the treatment and control groups. This lack of transparency raises doubts about the authors’ claims and the internal validity of these studies.

**Teacher design non-equivalent.** The second flaw, teacher design non-equivalency, could arise from a number of different study features. First, most of the reviewed empirical studies do not describe how teachers were assigned to the treatment and comparison groups and do not report characteristics of teachers who volunteered for the treatment and control sections. These studies disregard the influence that the underlying characteristics of individual teachers have on educational outcomes; variability in teacher characteristics could confound the relationship between the intervention and any outcomes. Second, even in a few randomized and quasi-experimental studies, treatment teachers demonstrated intrinsic motivation to improve their teaching by volunteering for the treatment group. That they possessed intrinsic motivation can be inferred from the fact that the treatment required them to attend training. Therefore, differences in instructional quality or motivation may be responsible for the outcomes of the study rather than the treatment. Finally, in a number of studies, the researcher was also the instructor of the treatment and/or control group(s), implying an unconscious or maybe even a conscious investment in ensuring the classroom intervention is effective, which calls into question the researcher’s impartiality in the implementation of the treatment and analysis of the results.

**Possible attrition issues.** Many studies do not address the substantial attrition that occurred over the course of the study. High attrition is common in studies at the developmental education level, where course dropout rates are high. If the attrition is more pronounced for students in a treatment or control group, it could bias the results of the study. For example, if lower-performing students were more likely to drop out of the control group, then this could have biased downward the impact of the treatment, but if lower-performing students dropped out of the treatment group at higher rates, then this could have inflated the impact of the treatment (for an illustration of differential attrition, see Figure 1 in Jaggars [2011]).
**No comparison group.** A comparison group provides information about what would have happened if the students did not receive the instructional intervention. It is not possible to attribute any observed outcomes to the instructional intervention when it is unknown if the student outcomes would have been similar, better, or worse in the absence of the treatment. Most of the quantitative studies employ a comparison group, while most of qualitative and descriptive studies do not. These studies provide important descriptive information about the outcomes of an instructional intervention or qualitative data about the challenges individual students may face when using alternative or reform-based math pedagogy, but they do not provide evidence of a causal link between the instructional practice or program and student outcomes.
Introduction to Cooperative Learning

An Overview Of Cooperative Learning

David W Johnson and Roger T Johnson

Without the cooperation of its members society cannot survive, and the society of man has survived because the cooperativeness of its members made survival possible.... It was not an advantageous individual here and there who did so, but the group. In human societies the individuals who are most likely to survive are those who are best enabled to do so by their group.

(Ashley Montagu, 1965)

How students interact with each another is a neglected aspect of instruction. Much training time is devoted to helping teachers arrange appropriate interactions between students and materials (i.e., textbooks, curriculum programs) and some time is spent on how teachers should interact with students, but how students should interact with one another is relatively ignored. It should not be. How teachers structure student-student interaction patterns has a lot to say about how well students learn, how they feel about school and the teacher, how they feel about each other, and how much self-esteem they have.

In the mid-1960s, cooperative learning was relatively unknown and largely ignored by educators. Elementary, secondary, and university teaching was dominated by competitive and individualistic learning. Cultural resistance to cooperative learning was based on social Darwinism, with its premise that students must be taught to survive in a “dog-eat-dog” world, and the myth of “rugged individualism” underlying the use of individualistic learning. While competition dominated educational thought, it was being challenged by individualistic learning largely based on B. F. Skinner’s work on programmed learning and behavioral modification. Educational practices and thought, however, have changed. Cooperative learning is now an accepted and often the preferred instructional procedure at all levels of education. Cooperative learning is presently used in schools and universities in every part of the world, in every subject area, and with every age student. It is difficult to find a text on instructional methods, a teacher’s journal, or instructional materials that do not discuss cooperative learning. Materials on cooperative learning have been translated into dozens of languages. Cooperative learning is now an accepted and highly recommended instructional procedure.

Definition of Cooperative Learning

Students’ learning goals may be structured to promote cooperative, competitive, or individualistic efforts. In every classroom, instructional activities are aimed at accomplishing goals and are conducted under a goal structure. A learning goal is a desired future state of demonstrating competence or mastery in the subject area being studied. The goal structure specifies the ways in which students will interact with each other and the teacher during the instructional session. Each goal structure has its place (Johnson & Johnson, 1989, 1999). In the ideal classroom, all students would learn how to work cooperatively with others, compete for fun and enjoyment, and work autonomously on their own. The teacher decides which goal structure to implement.
within each lesson. The most important goal structure, and the one that should be used the majority of the time in learning situations, is cooperation.

Cooperation is working together to accomplish shared goals. Within cooperative situations, individuals seek outcomes that are beneficial to themselves and beneficial to all other group members. Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning. It may be contrasted with competitive (students work against each other to achieve an academic goal such as a grade of “A” that only one or a few students can attain) and individualistic (students work by themselves to accomplish learning goals unrelated to those of the other students) learning. In cooperative and individualistic learning, you evaluate student efforts on a criteria-referenced basis while in competitive learning you grade students on a norm-referenced basis. While there are limitations on when and where you may use competitive and individualistic learning appropriately, you may structure any learning task in any subject area with any curriculum cooperatively.

Theorizing on social interdependence began in the early 1900s, when one of the founders of the Gestalt School of Psychology, Kurt Koffka, proposed that groups were dynamic wholes in which the interdependence among members could vary. One of his colleagues, Kurt Lewin refined Koffka’s notions in the 1920s and 1930s while stating that (a) the essence of a group is the interdependence among members (created by common goals) which results in the group being a “dynamic whole” so that a change in the state of any member or subgroup changes the state of any other member or subgroup, and (b) an intrinsic state of tension within group members motivates movement toward the accomplishment of the desired common goals. For interdependence to exist, there must be more than one person or entity involved, and the persons or entities must have impact on each other in that a change in the state of one causes a change in the state of the others. From the work of Lewin’s students and colleagues, such as Ovisankian, Lissner, Mahler, and Lewis, it may be concluded that it is the drive for goal accomplishment that motivates cooperative and competitive behavior.

In the late 1940s, one of Lewin’s graduate students, Morton Deutsch, extended Lewin’s reasoning about social interdependence and formulated a theory of cooperation and competition (Deutsch, 1949, 1962). Deutsch conceptualized three types of social interdependence—positive, negative, and none. Deutsch’s basic premise was that the type of interdependence structured in a situation determines how individuals interact with each other which, in turn, largely determines outcomes. Positive interdependence tends to result in promotive interaction, negative interdependence tends to result in oppositional or contrient interaction, and no interdependence results in an absence of interaction. Depending on whether individuals promote or obstruct each other’s goal accomplishments, there is substitutability, cathexis, and inducibility. The relationships between the type of social interdependence and the interaction pattern it elicits is assumed to be bidirectional. Each may cause the other. Deutsch’s theory has served as a major conceptual structure for this area of inquiry since 1949.

Types Of Cooperative Learning

Formal Cooperative Learning

Formal cooperative learning consists of students working together, for one class period to several weeks, to achieve shared learning goals and complete jointly specific tasks and assignments (Johnson, Johnson, & Holubec, 2008). In formal cooperative learning groups the teachers’ role includes (see Figure 4):
1. **Making preinstructional decisions.** Teachers (a) formulate both academic and social skills objectives, (b) decide on the size of groups, (c) choose a method for assigning students to groups, (d) decide which roles to assign group members, (e) arrange the room, and (f) arrange the materials students need to complete the assignment. In these preinstructional decisions, the social skills objectives specify the interpersonal and small group skills students are to learn. By assigning students roles, role interdependence is established. The way in which materials are distributed can create resource interdependence. The arrangement of the room can create environmental interdependence and provide the teacher with easy access to observe each group, which increases individual accountability and provides data for group processing.

2. **Explaining the instructional task and cooperative structure.** Teachers (a) explain the academic assignment to students, (b) explain the criteria for success, (c) structure positive interdependence, (d) structure individual accountability, (e) explain the behaviors (i.e., social skills) students are expected to use, and (f) emphasize intergroup cooperation (this eliminates the possibility of competition among students and extends positive goal interdependence to the class as a whole). Teachers may also teach the concepts and strategies required to complete the assignment. By explaining the social skills emphasized in the lesson, teachers operationalize (a) the social skill objectives of the lesson and (b) the interaction patterns (such as oral rehearsal and jointly building conceptual frameworks) teachers wish to create.

3. **Monitoring students’ learning and intervening to provide assistance in (a) completing the task successfully or (b) using the targeted interpersonal and group skills effectively.** While conducting the lesson, teachers monitor each learning group and intervene when needed to improve taskwork and teamwork. Monitoring the learning groups creates individual accountability; whenever a teacher observes a group, members tend to feel accountable to be constructive members. In addition, teachers collect specific data on promotive interaction, the use of targeted social skills, and the engagement in the desired interaction patterns. This data is used to intervene in groups and to guide group processing.

4. **Assessing students’ learning and helping students process how well their groups functioned.** Teachers (a) bring closure to the lesson, (b) assess and evaluate the quality and quantity of student achievement, (c) ensure students carefully discuss how effectively they worked together (i.e., process the effectiveness of their learning groups), (d) have students make a plan for improvement, and (e) have students celebrate the hard work of group members. The assessment of student achievement highlights individual and group accountability (i.e., how well each student performed) and indicates whether the group achieved its goals (i.e., focusing on positive goal interdependence). The group celebration is a form of reward interdependence. The feedback received during group processing is aimed at improving the use of social skills and is a form of individual accountability. Discussing the processes the group used to function, furthermore, emphasizes the continuous improvement of promotive interaction and the patterns of interaction need to maximize student learning and retention.

**Informal Cooperative Learning**

*Informal cooperative learning* consists of having students work together to achieve a joint learning goal in temporary, ad-hoc groups that last from a few minutes to one class period (Johnson, Johnson, & Holubec, 2008). During a lecture, demonstration, or film, informal cooperative learning can be used to focus student attention on the material to be learned, set a mood conducive to learning, help set expectations as to what will be covered in a class session, ensure that students cognitively process and rehearse the material being taught,
summarize what was learned and precue the next session, and provide closure to an instructional session. The teacher’s role for using informal cooperative learning to keep students more actively engaged intellectually entails having focused discussions before and after the lesson (i.e., bookends) and interspersing pair discussions throughout the lesson. Two important aspects of using informal cooperative learning groups are to (a) make the task and the instructions explicit and precise and (b) require the groups to produce a specific product (such as a written answer). The procedure is as follows.

1. **Introductory Focused Discussion**: Teachers assign students to pairs or triads and explain (a) the task of answering the questions in a four to five minute time period and (b) the positive goal interdependence of reaching consensus. The discussion task is aimed at promoting advance organizing of what the students know about the topic to be presented and establishing expectations about what the lecture will cover. Individual accountability is ensured by the small size of the group. A basic interaction pattern of eliciting oral rehearsal, higher-level reasoning, and consensus building is required.

2. **Intermittent Focused Discussions**: Teachers divide the lecture into 10 to 15 minute segments. This is about the length of time a motivated adult can concentrate on information being presented. After each segment, students are asked to turn to the person next to them and work cooperatively in answering a question (specific enough so that students can answer it in about three minutes) that requires students to cognitively process the material just presented. The procedure is:

   a. Each student formulates his or her answer.
   b. Students share their answer with their partner.
   c. Students listen carefully to their partner’s answer.
   d. The pairs create a new answer that is superior to each member’s initial formulation by integrating the two answers, building on each other’s thoughts, and synthesizing.

   The question may require students to:

   a. Summarize the material just presented.
   b. Give a reaction to the theory, concepts, or information presented.
   c. Predict what is going to be presented next; hypothesize.
   d. Solve a problem.
   e. Relate material to past learning and integrate it into conceptual frameworks.
   f. Resolve conceptual conflict created by presentation.

Teachers should ensure that students are seeking to reach an agreement on the answers to the questions (i.e., ensure positive goal interdependence is established), not just share their ideas with each other. Randomly choose two or three students to give 30 second summaries of their discussions. Such individual accountability ensures that the pairs take the tasks seriously and check each other to ensure that both are
prepared to answer. Periodically, the teacher should structure a discussion of how effectively the pairs are working together (i.e., group processing). Group celebrations add reward interdependence to the pairs.

3. Closure Focused Discussion: Teachers give students an ending discussion task lasting four to five minutes. The task requires students to summarize what they have learned from the lecture and integrate it into existing conceptual frameworks. The task may also point students toward what the homework will cover or what will be presented in the next class session. This provides closure to the lecture.

Informal cooperative learning ensures students are actively involved in understanding what is being presented. It also provides time for teachers to move around the class listening to what students are saying. Listening to student discussions can give instructors direction and insight into how well students understand the concepts and material being as well as increase the individual accountability of participating in the discussions.

Cooperative Base Groups

Cooperative base groups are long-term, heterogeneous cooperative learning groups with stable membership (Johnson, Johnson, & Holubec, 2008). Members’ primary responsibilities are to (a) ensure all members are making good academic progress (i.e., positive goal interdependence) (b) hold each other accountable for striving to learn (i.e., individual accountability), and (c) provide each other with support, encouragement, and assistance in completing assignments (i.e., promotive interaction). In order to ensure the base groups function effectively, periodically teachers should teach needed social skills and have the groups process how effectively they are functioning. Typically, cooperative base groups are heterogeneous in membership (especially in terms of achievement motivation and task orientation), meet regularly (for example, daily or biweekly), and last for the duration of the class (a semester or year) or preferably for several years. The agenda of the base group can include academic support tasks (such as ensuring all members have completed their homework and understand it or editing each other’s essays), personal support tasks (such as getting to know each other and helping each other solve nonacademic problems), routine tasks (such as taking attendance), and assessment tasks (such as checking each other’s understanding of the answers to test questions when the test is first taken individually and then retaken in the base group).

The teacher’s role in using cooperative base groups is to (a) form heterogeneous groups of four (or three), (b) schedule a time when they will regularly meet (such as beginning and end of each class session or the beginning and end of each week), (c) create specific agendas with concrete tasks that provide a routine for base groups to follow when they meet, (d) ensure the five basic elements of effective cooperative groups are implemented, and (e) have students periodically process the effectiveness of their base groups.

The longer a cooperative group exists, the more caring their relationships will tend to be, the greater the social support they will provide for each other, the more committed they will be to each other’s success, and the more influence members will have over each other. Permanent cooperative base groups provide the arena in which caring and committed relationships can be created that provide the social support needed to improve attendance, personalize the educational experience, increase achievement, and improve the quality of school life.

Integrated Use Of All Three Types Of Cooperative Learning
These three types of cooperative learning may be used together (Johnson, Johnson, & Holubec, 2008). A typical class session may begin with a base group meeting, which is followed by a short lecture in which informal cooperative learning is used. The lecture is followed by a formal cooperative learning lesson. Near the end of the class session another short lecture may be delivered with the use of informal cooperative learning. The class ends with a base group meeting.

**Basic Elements of Cooperation**

Not all groups are cooperative (Johnson & F. Johnson, 2009). Placing people in the same room, seating them together, telling them they are a group, does not mean they will cooperate effectively. To be cooperative, to reach the full potential of the group, five essential elements need to be carefully structured into the situation: positive interdependence, individual and group accountability, promotive interaction, appropriate use of social skills, and group processing (Johnson & Johnson, 1989, 2005). Mastering the basic elements of cooperation allows teachers to:

1. Take existing lessons, curricula, and courses and structure them cooperatively.
2. Tailor cooperative learning lessons to unique instructional needs, circumstances, curricula, subject areas, and students.
3. Diagnose the problems some students may have in working together and intervene to increase the effectiveness of the student learning groups.

The first and most important element is positive interdependence. Teachers must give a clear task and a group goal so students believe they “sink or swim together.” Positive interdependence exists when group members perceive that they are linked with each other in a way that one cannot succeed unless everyone succeeds. If one fails, all fail. Group members realize, therefore, that each person’s efforts benefit not only him- or herself, but all other group members as well. Positive interdependence creates a commitment to other people’s success as well as one’s own and is the heart of cooperative learning. If there is no positive interdependence, there is no cooperation.

The second essential element of cooperative learning is individual and group accountability. The group must be accountable for achieving its goals. Each member must be accountable for contributing his or her share of the work (which ensures that no one “hitch-hikes” on the work of others). The group has to be clear about its goals and be able to measure (a) its progress in achieving them and (b) the individual efforts of each of its members. Individual accountability exists when the performance of each individual student is assessed and the results are given back to the group and the individual in order to ascertain who needs more assistance, support, and encouragement in completing the assignment. The purpose of cooperative learning groups is to make each member a stronger individual in his or her right. Students learn together so that they can subsequently perform higher as individuals.

The third essential component of cooperative learning is promotive interaction, preferably face-to-face. Promotive interaction occurs when members share resources and help, support, encourage, and praise each other’s efforts to learn. Cooperative learning groups are both an academic support system (every student has someone who is committed to helping him or her learn) and a personal support system (every student has
someone who is committed to him or her as a person). There are important cognitive activities and interpersonal dynamics that can only occur when students promote each other’s learning. This includes orally explaining how to solve problems, discussing the nature of the concepts being learned, teaching one’s knowledge to classmates, and connecting present with past learning. It is through promoting each other’s learning face-to-face that members become personally committed to each other as well as to their mutual goals.

The fourth essential element of cooperative learning is teaching students the required interpersonal and small group skills. In cooperative learning groups students are required to learn academic subject matter (taskwork) and also to learn the interpersonal and small group skills required to function as part of a group (teamwork). Cooperative learning is inherently more complex than competitive or individualistic learning because students have to engage simultaneously in taskwork and teamwork. Group members must know how to provide effective leadership, decision-making, trust-building, communication, and conflict-management, and be motivated to use the prerequisite skills. Teachers have to teach teamwork skills just as purposefully and precisely as teachers do academic skills. Since cooperation and conflict are inherently related, the procedures and skills for managing conflicts constructively are especially important for the long-term success of learning groups. Procedures and strategies for teaching students social skills may be found in Johnson (2009) and Johnson and F. Johnson (2009).

The fifth essential component of cooperative learning is group processing. Group processing exists when group members discuss how well they are achieving their goals and maintaining effective working relationships. Groups need to describe what member actions are helpful and unhelpful and make decisions about what behaviors to continue or change. Continuous improvement of the process of learning results from the careful analysis of how members are working together.

These five elements are essential to all cooperative systems, no matter what their size. When international agreements are made and when international efforts to achieve mutual goals (such as environmental protection) occur, these five elements must be carefully implemented and maintained.

The Validating Research

Amount And Characteristics Of Research

The study of cooperative, competitive, and individualistic efforts is commonly recognized as one of the oldest fields of research in social psychology. In the late 1800’s Triplett in the United States, Turner in England, and Mayer in Germany conducted a series of studies on the factors associated with competitive performance. Since then over 750 studies have been conducted on the relative merits of cooperative, competitive, and individualistic efforts and the conditions under which each is appropriate. This is one of the largest bodies of research within psychology and education.

An extensive literature search was conducted aimed at identifying all the available studies from published and nonpublished sources. Seven-hundred-fifty-four studies contained enough data to compute an effect size (there are many studies from which an effect size could not be computed) (Johnson & Johnson, 1989). The research on social interdependence, furthermore, has an external validity and a generalizability rarely found in the social sciences. The more variations in places, people, and procedures the research can withstand and still
yield the same findings, the more externally valid the conclusions. The research has been conducted over
twelve decades by many different researchers with markedly different theoretical and practical orientations
working in different settings and countries. A wide variety of research tasks, ways of structuring social
interdependence, and measures of the dependent variables have been used. Participants in the studies varied
from ages three to post-college adults and have come from different economic classes and cultural
backgrounds. The studies were conducted with different durations, lasting from one session to 100 sessions or
more. Research on social interdependence has been conducted in numerous cultures in North America (with
Caucasian, Black-American, Native-American, and Hispanic populations) and countries from North, Central,
and South America, Europe, the Middle East, Asia, the Pacific Rim, and Africa. The research on social
interdependence includes both theoretical and demonstration studies conducted in educational, business, and
social service organizations. The diversity of these studies gives social interdependence theory wide
generalizability and considerable external validity.

Promotive, oppositional, and no interaction have differential effects on the outcomes of the situation (see
Johnson & Johnson, 1989, 2005). The research has focused on numerous outcomes, which may be subsumed
within the broad and interrelated categories of effort to achieve, quality of relationships, and psychological
health (Johnson, 2003; Johnson & Johnson, 1989, 2005) (see Table 1 and Figure 2). Figure 1 shows the
relationships among the outcomes.

Table 1

Mean Effect Sizes For Impact Of Social Interdependence On Dependent
Variables

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Achievement</th>
<th>Interpersonal Attraction</th>
<th>Social Support</th>
<th>Self-Esteem</th>
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</thead>
<tbody>
<tr>
<td>Total Studies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop vs. Comp</td>
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<td>0.67</td>
<td>0.62</td>
<td>0.58</td>
</tr>
<tr>
<td>Coop vs. Ind</td>
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<td>0.60</td>
<td>0.70</td>
<td>0.44</td>
</tr>
<tr>
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<td>0.08</td>
<td>-0.13</td>
<td>-0.23</td>
</tr>
<tr>
<td>High Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coop vs. Comp</td>
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<td>0.82</td>
<td>0.83</td>
<td>0.67</td>
</tr>
<tr>
<td>Coop vs. Ind</td>
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<td>0.62</td>
<td>0.72</td>
<td>0.45</td>
</tr>
<tr>
<td>Comp vs. Ind</td>
<td>0.07</td>
<td>0.27</td>
<td>-0.13</td>
<td>-0.25</td>
</tr>
</tbody>
</table>

Note: Coop = Cooperation, Comp = Competition, Ind = Individualistic

Effort To Achieve

From Table 1 it may be seen that cooperation promotes considerable greater effort to achieve than do competitive or individualistic efforts. Effort exerted to achieve includes such variables as achievement and productivity, long-term retention, on-task behavior, use of higher-level reasoning strategies, generation of new ideas and solutions, transfer of what is learned within one situation to another, intrinsic motivation, achievement motivation, continuing motivation to learn, and positive attitudes toward learning and school. Overall, cooperation tends to promote higher achievement than competitive or individualistic efforts (effect-sizes = 0.67 and 0.64 respectively). The impact of cooperative learning on achievement means that if schools wish to prepare students to take proficiency tests to meet local and state standards, the use of cooperative learning should dominate instructional practice.

An important aspect of school life is engagement in learning. One indication of engagement in learning is time on task. Cooperators spent considerably more time on task than did competitors (effect size = 0.76) or students working individualistically (effect size = 1.17). In addition, students working cooperatively tended to be more involved in activities and tasks, attach greater importance to success, and engage in more on-task behavior and less apathetic, off-task, disruptive behaviors. Finally, cooperative experiences, compared with competitive and individualistic ones, have been found to promote more positive attitudes toward the task and the experience of working on the task (effect-sizes = 0.57 and 0.42 respectively).

Quality Of Relationships

Quality of relationships includes such variables as interpersonal attraction, liking, cohesion, esprit-de-corps, and social support. The degree of emotional bonding that exists among students has a profound effect on students’ behavior. The more positive the relationships among students and between students and faculty, the lower the absenteeism and dropout rates and the greater the commitment to group goals, feelings of personal responsibility to the group, willingness to take on difficult tasks, motivation and persistence in working toward goal achievement, satisfaction and morale, willingness to endure pain and frustration on behalf of the group, willingness to defend the group against external criticism or attack, willingness to listen to and be influenced by colleagues, commitment to each other’s professional growth and success, and productivity (Johnson & F. Johnson, 2009).

There are over 175 studies that have investigated the relative impact of cooperative, competitive, and individualistic efforts on quality of relationships and another 106 studies on social support (Johnson, 2003; Johnson & Johnson, 1989, 2005). As Table 2 shows, cooperation generally promotes greater interpersonal attraction among individuals than does competitive or individualistic efforts (effect sizes = 0.67 and 0.60 respectively). Cooperative experiences tend to promote greater social support than does competitive (effect-size = 0.62) or individualistic (effect-size = 0.70) efforts. Stronger effects are found for peer support than for superior (teacher) support. The high-quality studies tend to have even more powerful effects.

It is difficult to overemphasize the importance of these research results. Friends are a developmental advantage (see Johnson, 2003; Johnson & Johnson, 1989, 2005). There is a close association between antisocial behavior and rejection by the normal peer group. Rejected children tend to be deficient in a number of social-cognitive skills, including peer group entry, perception of peer group norms, response to provocation,
and interpretation of prosocial interactions. Among children referred to child guidance clinics, 30 to 75 percent (depending on age) are reported by their parents to experience peer difficulties. Moreover, children referred for psychological treatment have fewer friends and less contact with them than nonreferred children, their friendships are significantly less stable over time, and their understanding of the reciprocities and intimacies involved in friendships is less mature. Peer group acceptance and friendships may be built through the extensive use of cooperative learning.

**Psychological Health**

Asley Montagu (1966) was fond of saying that with few exceptions the solitary animal in any species is an abnormal creature. Similarly, Karen Horney (1937) stated that the neurotic individual is someone who is inappropriately competitive and, therefore, unable to cooperate with others. Montagu and Horney recognized that the essence of psychological health is the ability to develop and maintain cooperative relationships. More specifically, **psychological health** is the ability (cognitive capacities, motivational orientations, and social skills) to build, maintain, and appropriately modify interdependent relationships with others to succeed in achieving goals (Johnson, 2003; Johnson & Johnson, 1989, 2005). People who are unable to do so often (a) become depressed, anxious, frustrated, and lonely, (b) tend to feel afraid, inadequate, helpless, hopeless, and isolated, and (c) rigidly cling to unproductive and ineffective ways of coping with adversity.

With our students and colleagues, we have conducted a series of studies relating cooperative, competitive, and individualistic efforts and attitudes to various indices of psychological health (see Johnson, 2003; Johnson & Johnson, 1989, 2005). The samples studied included middle-class junior-high students, middle-class high school seniors, high-school age juvenile prisoners, adult prisoners, Olympic ice-hockey players, adult step-couples, and business executives in China. The diversity of the samples studied and the variety of measures of psychological health provide considerable generalizability of the results of the studies. A strong relationship was found between cooperativeness and psychological health, a mixed picture was found with competitiveness and psychological health, and a strong relationship was found between an individualistic orientation and psychological pathology.

Finally, there is evidence that cooperation promotes more frequent use of higher level reasoning strategies than do competitive (effect size = 0.93) or individualistic (effect size = 0.97) efforts. Similarly, cooperation tends to promote more accurate perspective taking than do competitive (effect size = 0.61) or individualistic (effect size = 0.44) efforts. Thus, the more cooperative learning experiences students are involved in, the more mature their cognitive and moral decision making and the more they will tend to take other people’s perspectives in account when making decisions.

**Conclusions and Summary**

Teachers who wish to use cooperative learning should ideally base their classroom practices on theory validated by research. The closer classroom practices are to validated theory, the more likely they will be effective. When more directly practice is connected to theory, furthermore, the more likely practice will be refined, upgraded, and improved over the years. There are, however, few classroom practices that are directly based on validated theory. The close relationship between theory, research, and practice makes cooperative learning somewhat unique. It also creates a set of issues for teachers using cooperative learning.
The first issue is understanding the nature of social interdependence. Social interdependence is created when goals are structured so that the accomplishment of a person’s goal is affected by others’ actions. The interdependence may be positive (which results in individuals working cooperatively to achieve their mutual goals) or negative (which results in individuals competing to see who will achieve the goal). The absence of interdependence indicates no connection between people’s attempts to achieve their goals. In cooperative situations, students’ actions substitute for each other, students are inducible, and a positive cathexis is created toward other’s actions. In competitive situations, the opposite psychological processes may be found. The fundamental premise of social interdependence theory is that the way in which goals are structured determines how individuals interact, and those interaction patterns create outcomes. Positive goal interdependence tends to result in promotive interaction, negative goal interdependence tends to result in oppositional interaction, and no interdependence tends to result in no interaction.

The second issue is understanding the research validating social interdependence theory. There are hundreds of studies indicating that cooperation, compared to competitive and individualistic efforts, tends to result in greater effort to achieve, more positive relationships, and greater psychological health. The diversity of this research provides considerable generalizability to the findings.

The third issue is to understand the five basic elements that make cooperation work. There is nothing magical about putting students in groups. Students can compete with groupmates, students can work individualistically while ignoring groupmates, or students can work cooperatively with groupmates. In order to structure cooperative learning effectively, teachers need to understand how to structure positive interdependence, individual accountability, promotive interaction, appropriate use of social skills, and group processing into learning situations.

The fourth issue is to understand the flexibility and many faces of cooperative learning. When the five basic elements may be effectively implemented in formal cooperative learning situations (formal cooperative learning may be used to structure most learning situations), informal cooperative learning situations (informal cooperative learning may be used to make didactic lessons cooperative), and cooperative base groups (which are used to personalize a class and the school). Together they provide an integrated system for instructional organization and design (as well as classroom management). When utilizing these three types of cooperative learning, any learning situations in any subject area with any age students and with any curriculum can be structured cooperatively.

References


Development and Use of the ARCS Model of Instructional Design

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Abstract. The ARCS Model of motivation was developed in response to a desire to find more effective ways of understanding the major influences on the motivation to learn, and for systematic ways of identifying and solving problems with learning motivation. The resulting model contains a four category synthesis of variables that encompasses most of the areas of research on human motivation, and a motivational design process that is compatible with typical instructional design models. Following its development, the ARCS Model was field tested in two inservice teacher education programs. Based on the results of these field tests, the ARCS Model appears to provide useful assistance to designers and teachers, and warrants more controlled studies of its critical attributes and areas of effectiveness.

Can Motivation be Systematically Influenced?

Seldom do the arguments about the boundaries of a teacher’s responsibilities or whether teaching is an art or science become more animated than when discussing the motivation of students. Instructional designers have similar concerns. Typically, motivation is viewed as highly unpredictable and changeable, subject to many influences over which the teacher or designer has no control. Consequently, both teachers and designers often view their responsibility as providing good quality instruction, and assume it is the student’s responsibility to decide whether or not to take advantage of the opportunity to learn.

However, this is a rationalization in that we know that no matter how motivated learners are when they begin a course, it is not too difficult to bore them, if not kill their interest totally. Conversely, it is possible to stimulate or even inspire the students’ desire to achieve. Perhaps the rationalization results from the assumption that motivation is a largely uncontrollable state; therefore, it is easier to think of it as the student’s responsibility.

With respect to students’ social behavior most teachers do assume that motivation can be controlled by the appropriate application of rules and reinforcements. But when it comes to inspiring interest in a school subject, the popular view is that it requires intuition and native talent. How many times have you heard a teacher or designer say, “I know my subject, but I’m not really an entertainer?”

A concern for these issues led to the exploration of two specific questions. First, is it possible to synthesize the many concepts and theories of human motivation into a simple, meaningful model, or schema, that would be useful to a practitioner? Secondly, is it possible to develop a systematic, as opposed to intuitive, approach to designing motivating instruction? Exploration of these questions led to a review of the literature, the development of an approach called the ARCS Model, and field tests of the model with two different groups of teachers.

What is the ARCS Model?

The ARCS Model (Keller, 1984) is a method for improving the motivational appeal of instructional materials. It has three distinctive features. First, it contains four conceptual categories that subsume many of the specific concepts and variables that characterize human motivation. Second, it includes sets of strategies to use to enhance the motivational appeal of instruction. And third, it incorporates a systematic design process, called motivational design (Keller, 1987), that can be used effectively with traditional instructional design models. Each of these is described in further detail below.

Why the ARCS Model?

When work began (Keller, 1979) on the development of the ARCS Model, there were no macro theories or models that directly addressed the question of how to create instruction that would stimulate the motivation to learn. Most of the applications-oriented theory and research on motivation dealt either with psychological approaches to changing individual motivational characteristics (e.g. McClelland, 1965), or with job satisfaction and work performance (e.g. Steers & Porter, 1987).

In education, motivation was most generally studied in terms of classroom control (e.g. Doyle, 1985), reinforcement of learning (e.g. Skinner, 1961), or the affective outcomes of instruction (e.g. Krathwohl, Bloom, & Masia, 1964). There were some good applications-oriented materials (e.g. Mager, 1968; Wlodkowski, 1978), but they tended to be somewhat restricted in their approach and theoretical foundation. They did not help the designer or teacher know how many or what types of strategies to use with a given audience, and they did not incorporate important principles from several areas of motivational research that have been studied in recent years (e.g. curiosity, sensation seeking, and intrinsic motivation). Subsequently, work has been done to help students learn how to be self-motivated (e.g. McCombs, 1984), and Wlodkowski (1985) has expanded the scope of content and application of his work. But, none of these models takes a design, or problem-solving approach.

Where Did the ARCS Model Originate?

The ARCS Model is based upon the macro theory of motivation and instructional design developed by Keller (1979, 1983). It is grounded in expectancy-value theory which derives from the work of Tolman (1932) and Lewin (1938). Expectancy-value theory assumes that people are motivated to en-
gage in an activity if it is perceived to be linked to the satisfaction of personal needs (the value aspect), and if there is a positive expectancy for success (the expectancy aspect).

In the original model (Keller, 1979, 1983), these two categories were expanded to four. The category called value was subdivided into two categories called interest and relevance. The third category, expectancy, remained the same, and a fourth category called outcomes was added. Interest and relevance were separated to make a distinction between a set of variables, or constructs, that are concerned primarily with curiosity and arousal versus other motives such as “need for achievement” and “perceived utility.” All of these variables have an influence on what people think is important, but interest refers more to attentional factors in the environment, and relevance refers more to goal directed activity.

The third category, expectancy, refers to one’s expectation for being successful. It includes several areas of research that are concerned with people’s self-confidence and their feelings of control over their lives and environment. There is no doubt that a person’s perception of the likelihood of being successful influences the actual degree of success (Jones, 1977).

The fourth category, outcomes, refers to the reinforcing value of instruction. The outcomes of goal-directed behavior have an influence on subsequent levels of perceived value and expectancy for success and, therefore, form the final category of motivational variables in the ARCS model. The outcomes category includes the appropriate application of reinforcement as explained in operant conditioning theory, and the environmental outcomes that help maintain intrinsic motivation (e.g. Deci, 1975). More detailed explanations of this synthesis and its rationale are provided by Keller (1983).

Building on this conceptual foundation, the ARCS Model was created by generating a large list of motivational strategy statements, and sorting them to see whether the four categories of the model provided a conceptually valid typology. All of the strategies used in the development of the model were derived from research findings and from practices that have resulted in motivated learners. Strategy statements were obtained from research studies in the primary areas of research on human motivation, from practical handbooks, and from interviews with practitioners. The strategy statements were then sorted into the four categories, and were further divided into useful subcategories (see Tables 1, 2, 3, 4). Four people worked on the classification process, and the correspondence of judgments for the placement of strategies into categories was acceptable. The reliability estimate based on the intra-class correlation method (Winer, 1971) was .78.

During the transition from the original model to the ARCS Model, the four categories were renamed as indicated below to strengthen the central feature of each and to generate a useful acronym. The resulting catalog of strategies is used in the process of identifying and solving motivational problems in instructional materials and methods (Keller & Kopp, 1987), and in computer assisted instruc-

The ARCS Model includes a systematic design process. It can be conveniently separated into the steps of define, design, develop, and evaluate.

The reinforcing value of instruction (Keller & Suzuki, 1987).

Components of the ARCS Model

The ARCS Model defines four major conditions (Attention, Relevance, Confidence, and Satisfaction) that have to be met for people to become and remain motivated. As previously indicated, each of these conditions subsumes several areas of psychological research (Keller, 1979, 1983), and has been divided into specific subcategories with sample motivational strategy prescriptions (Keller, 1983; Keller & Kopp, 1987, Keller & Suzuki, 1987). Following is a brief description of each of the four major conditions.

Attention. The first condition, attention, is an element of motivation and is also a prerequisite for learning. The motivational concern is for getting and sustaining attention. As an element of learning, the concern is for directing attention to the appropriate stimuli. At one level, it is fairly easy to gain attention. A dramatic statement, a sharp noise, a quiet pause—all of these and many other devices are used.

However, getting attention is not enough. A real challenge is to sustain it, to produce a satisfactory level of attention throughout a period of instruction. To do this, it is necessary to respond to the sensation-seeking needs of students (Zuckerman, 1971) and arouse their knowledge-seeking curiosity (Berlyne, 1965), but without overstimulating them. The goal is to find a balance between boredom and indifference versus hyperactivity and anxiety. The strategies listed under categories A5 and A6 (Table 1) are particularly useful in sustaining attention.

Relevance. How many times have we heard students ask, “Why do I have to study this?” When a convincing answer is not forthcoming, there is a relevance problem. To answer this question, many course designers and instructors try to make the instruction seem relevant to present and future career opportunities for the students (categories R2 and R3, Table 2). Others, in a more classical tradition, believe that learning should be an end in itself, something that students come to enjoy and treasure. Both of these can be important, but there is a third way. It focuses on process rather than ends.

Relevance can come from the way something is taught; it does not have to come from the content itself (categories R4 and R5, Table 2). For example, people high in “need for affiliation” will tend to enjoy classes in which they can work cooperatively in groups. Similarly, people high in “need for achievement” enjoy the opportunity to set moderately challenging goals, and to take personal responsibility for achieving them. To the extent that a course of instruction offers opportunities for an individual to satisfy these and other needs, the person will have a feeling of perceived relevance.

Confidence. Some people never quite achieve success even when the odds are in their favor; others always seem to excell through no matter what the odds.
Table 1
Attention Strategies

<table>
<thead>
<tr>
<th>A1: Incongruity, Conflict</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1.1 Introduce a fact that seems to contradict the learner’s past experience.</td>
</tr>
<tr>
<td>A1.2 Present an example that does not seem to exemplify a given concept.</td>
</tr>
<tr>
<td>A1.3 Introduce two equally plausible facts or principles, only one of which can be true.</td>
</tr>
<tr>
<td>A1.4 Play devil’s advocate.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>A2: Concreteness</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2.1 Show visual representations of any important object or set of ideas or relationships.</td>
</tr>
<tr>
<td>A2.2 Give examples of every instructionally important concept or principle.</td>
</tr>
<tr>
<td>A2.3 Use content-related anecdotes, case studies, biographies, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A3: Variability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A3.1 In stand up delivery, vary the tone of your voice, and use body movement, pauses, and props.</td>
</tr>
<tr>
<td>A3.2 Vary the format of instruction (information presentation, practice, testing, etc.) according to the attention span of the audience.</td>
</tr>
<tr>
<td>A3.3 Vary the medium of instruction (platform delivery, film, video, print, etc.)</td>
</tr>
<tr>
<td>A3.4 Break up print materials by use of white space, visuals, tables, different typefaces, etc.</td>
</tr>
<tr>
<td>A3.5 Change the style of presentation (humorous-serious, fast-slow, loud-soft, active-passive, etc.).</td>
</tr>
<tr>
<td>A3.6 Shift between student-instructor interaction and student-student interaction.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A4: Humor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4.1 Where appropriate, use plays on words during redundant information presentation.</td>
</tr>
<tr>
<td>A4.2 Use humorous introductions.</td>
</tr>
<tr>
<td>A4.3 Use humorous analogies to explain and summarize.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A5: Inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>A5.1 Use creativity techniques to have learners create unusual analogies and associations to the content.</td>
</tr>
<tr>
<td>A5.2 Build in problem solving activities at regular intervals.</td>
</tr>
<tr>
<td>A5.3 Give learners the opportunity to select topics, projects and assignments that appeal to their curiosity and need to explore.</td>
</tr>
</tbody>
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<table>
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<tr>
<th>A6: Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A6.1 Use games, role plays, or simulations that require learner participation.</td>
</tr>
</tbody>
</table>

Table 2
Relevance Strategies

<table>
<thead>
<tr>
<th>R1: Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1.1 State explicitly how the instruction builds on the learner’s existing skills.</td>
</tr>
<tr>
<td>R1.2 Use analogies familiar to the learner from past experience.</td>
</tr>
<tr>
<td>R1.3 Find out what the learners’ interests are and relate them to the instruction.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>R2: Present Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td>R2.1 State explicitly the present intrinsic value of learning the content, as distinct from its value as a link to future goals.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>R3: Future Usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td>R3.1 State explicitly how the instruction relates to future activities of the learner.</td>
</tr>
<tr>
<td>R3.2 Ask learners to relate the instruction to their own future goals (future wheel).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>R4: Need Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>R4.1 To enhance achievement striving behavior, provide opportunities to achieve standards of excellence under conditions of moderate risk.</td>
</tr>
<tr>
<td>R4.2 To make instruction responsive to the power motive, provide opportunities for responsibility, authority, and interpersonal influence.</td>
</tr>
<tr>
<td>R4.3 To satisfy the need for affiliation, establish trust and provide opportunities for no-risk, cooperative interaction.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>R5: Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>R5.1 Bring in alumni of the course as enthusiastic guest lecturers.</td>
</tr>
<tr>
<td>R5.2 In a self-paced course, use those who finish first as deputy tutors.</td>
</tr>
<tr>
<td>R5.3 Model enthusiasm for the subject taught.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>R6: Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>R6.1 Provide meaningful alternative methods for accomplishing a goal.</td>
</tr>
<tr>
<td>R6.2 Provide personal choices for organizing one’s work.</td>
</tr>
</tbody>
</table>
Differences in confidence, the third major component of the model, can influence a student’s persistence and accomplishment.

There are several factors that contribute to one’s level of confidence, or expectancy for success. For example, confident people tend to attribute the causes of success to things such as ability and effort instead of luck or the difficulty of the task (Weiner, 1974; Dweck, 1986). They also tend to be oriented toward involvement in the task activity and enjoy learning even if it means making mistakes. Also, confident people tend to believe that they can effectively accomplish their goals by means of their actions (Bandura, 1977; Bandura & Schunk, 1981). In contrast, unconfident people often have more of an ego involvement; they want to impress others and they worry about failing (Dweck, 1986).

Fear of failure is often stronger in students than teachers realize. A challenge for teachers in generating or maintaining motivation is to foster the development of confidence despite the competitiveness and external control that often exist in schools.

The preceding research results are reflected in the confidence building strategies (Table 3) that can be used by an instructional designer or teacher. The purpose of most of these strategies is to help the learner form the impression that some level of success is possible if effort is exerted. It is, of course, important to avoid creating this impression if it is false. If success is not possible with a rea-
sonable amount of effort, then the instruction should be redesigned or the student should be given appropriate counsel.

**Satisfaction.** This category incorporates research and practices that help make people feel good about their accomplishments. According to reinforcement theory, people should be more motivated if the task and the reward are defined, and an appropriate reinforcement schedule is used (categories S3 and S5, Table 4). Generally this is true, but people sometimes become resentful and even angry when they are told what they have to do, and what they will be given as a reward. Why would this be so? An important part of the answer seems to be “control.”

When a student is required to do something to get a reward that a teacher controls, resentment may occur because the teacher has taken over part of the student’s sphere of control over his or her own life. This is especially likely to happen when the behavior you control is one which the student enjoys for intrinsically satisfying reasons. The establishment of external control over an intrinsically satisfying behavior can decrease the person’s enjoyment of the activity (Lepper & Greene, 1979).

There are appropriate ways to use extrinsic rewards in learning situations, and to stimulate intrinsic reward. A challenge is to provide appropriate contingencies without overcontrolling, and to encourage the development of intrinsic satisfaction (categories S1, S2, and S4, Table 4).

In summary, these four categories form the basis of the ARCS Model. Within each are subcategories that include prescriptive motivational strategies (see Keller & Kopp, 1987; Keller & Suzuki, 1987). However, given the purpose of this model for helping to identify specific ways to make instruction more appealing, there is still the question of procedure: How is the ARCS Model used in instructional development or lesson planning? The following two sections provide a brief description of this process, and the results of using the model with two groups of teachers.

**Using the ARCS Model**

The ARCS Model includes a systematic design process that can be used with typical instructional design and development models. It can be conveniently separated into the steps of define, design, develop, and evaluate (see Table 5).

**Define.** Prior to the field tests reported in the next section, the define phase had two purposes; audience analysis and preparation of objectives. During the field tests a third purpose called “problem classification” was added as the first step in the process. It became clear that an unstated but important constraint of the ARCS Model is that, in its present form, it is designed to help make a course of instruction more motivating for a rea-

Seldom do the arguments about the boundaries of teacher's responsibilities or whether teaching is an art or science become more animated than when discussing the motivation of students.

...
class will express confidence that they can finish the unit successfully if they try hard.” By creating specific motivational objectives, the designer or instructor is better able to choose appropriate strategies.

**Design.** The first step in design is to create a list of potential motivational strategies for each of the objectives. At this point, it is generally best to use a brainstorming approach to create a broad range of strategy ideas. The goal is to move away from the analytical thinking that characterizes the define phase, and to begin thinking in an uncritical, more creative mode. By creating a variety of possible strategies the likelihood of finding optimal strategies is increased.

The next step is to critically review the potential strategies, and select the ones to be used. Five guidelines that help accomplish this are that the motivational strategies should:

- (a) not take up too much instructional time,
- (b) not detract from the instructional objectives,
- (c) fall within the time and money constraints of the development and implementation aspects of the instruction,
- (d) be acceptable to the audience, and
- (e) be compatible with the delivery system, including the instructor’s personal style and preferences.

All of these criteria exemplify the central concern for motivation as a means to an end, not an end in itself. For example, if students come to class already motivated, do not inject a large number of motivational strategies. This could slow the instruction, and cause the students to focus on the entertaining motivational strategies to the detriment of the instructional objectives. This is illustrated by a foreign language teacher who spent so much time with the students planning a culturally enriching banquet that she covered only half of the required content. At first the students enjoyed it, but they became annoyed when they realized that they would not be properly prepared for the next level of study. Motivational strategies should stimulate the motivation to learn (Brophy, 1983), and not detract from the learning process.

The strategies included in the model are proven in that they are based on research and successful practices, but their effectiveness, and the exact way in which they are implemented depends in part on the personality of the instructor, and the type of atmosphere that he or she desires (e.g. formal versus informal). Consequently, the final selection of strategies for a given instructional event is based, in large part, upon the judgments of the designer and teacher rather than upon objective criteria. In this sense, even though the ARCS Model

<table>
<thead>
<tr>
<th>DEFINE</th>
<th>DEVELOP</th>
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<tbody>
<tr>
<td>Classify problem</td>
<td>Prepare motivational elements</td>
</tr>
<tr>
<td>Analyze audience motivation</td>
<td>Integrate with instruction</td>
</tr>
<tr>
<td>Prepare motivational objectives</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESIGN</th>
<th>EVALUATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate potential strategies</td>
<td>Conduct developmental try-out</td>
</tr>
<tr>
<td>Select strategies</td>
<td>Assess motivational outcomes</td>
</tr>
</tbody>
</table>

**Table 5**

The Motivational Design Model

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Relevance can come from the way something is taught; it does not have to come from the content itself.
ducted by a trainer who was familiar with the motivational material encompassed by the ARCS Model, and included one session in which the author presented the specific strategies and procedures of the model.

During the four months of the project, the teachers went through the complete process of defining a motivational problem, formulating objectives, selecting strategies, preparing an implementation plan, enacting the plan, and reporting results. Most of the teachers worked on developing or revising modules of instruction to make them more interesting, but some worked on the motivational problems of specific students.

There were two criteria for success in this developmental test, both of which were attitudinal. First was that the participants would, after being taught the basic characteristics of the model, regard it as being comprehensible and useful. This criterion was important because the ARCS Model draws upon a broad base of psychological concepts and research that has not been studied by most teachers. For the ARCS Model to be acceptable to practitioners, it has to be presented in familiar, practical language. The second criterion was that after using the ARCS Model, they would believe that it helped them do a better job of improving the motivational appeal of instruction than they would have done otherwise.

In response to a questionnaire with 5 point response scales ranging from strongly disagree to strongly agree, all of the participants responded positively (agree or strongly agree) to the first criterion, and sixteen (89%) responded positively to the second. The other two were neutral. In a “Comments” section, they said that they gained some insights from learning and using the model, but they used more or less the same motivational strategies that they would have used anyway. Both of these teachers, according to comments from the principal and other teachers, had excellent reputations as motivators. Given the overall positive responses, this test of the ARCS Model was judged to be supportive of its acceptability and utility.

An interesting consequence of using the ARCS Model in this setting occurred: Some of the teachers, in their conclusions, suggested that the key factor in the process was that they had simply paid more attention to the student, or class. At first, this seemed to be a disappointing result for the ARCS Model. Why have a reasonably complex, formalized model if ‘paying more attention’ is all that is required?

Upon reflection, it became clear that the teachers were not giving themselves enough credit for what they had actually accomplished. After analyzing their action plans and logbooks, it was obvious that they used specific strategies to bring about the change. For them, ‘attention’ was simply a convenient word to summarize a great many specific acts.

A second test was conducted with another group consisting of 16 teachers from primary, middle, and secondary schools within a single school district in northeastern New York. This was a six-day workshop on motivational design conducted by the author and two assistants for two days in three successive months. One day each month was spent in a working session with the teachers, and the other day each month was used for classroom visitations and individual consultation.

At the end of the first session, the teachers had defined their motivational problems. During the next four weeks, they were to work on collecting data to verify the problem, and to develop a preliminary strategy list. They were enthusiastic at the end of the first session, but by the beginning of second session one month later, several had encountered difficulties and become discouraged.

After analyzing their problem statements and progress reports, it appeared that the differences were due primarily to the type of problem chosen by the participant. The workshop leaders had encouraged the participants to work on instructional improvement problems that were fairly small in scope; that is, to chose a unit or lesson which they would analyze and improve with respect to its motivational characteristics. Instead, several of the teachers had chosen to work on the personal motivational problems of individual students. Some of these students had personal problems and family situations that would be a challenge even for an experienced psychotherapist.

In general, the teachers who chose instructional improvement projects had made better progress and felt more positive. However, some of these teachers enlarged the scope of the project after the first session, or failed to reduce the scope as recommended by the workshop leaders. Consequently, the first part of the second session was spent reviewing the chosen problems and scope of work. After the concerned teachers redefined their problems into something more manageable, their progress improved quickly.

The difficulties experienced with the second group were reflected in the ratings obtained from the questionnaires on the two criteria as described above in the first study. After the second session, 10 of the 12 teachers (83%) agreed that the model seemed comprehensible and useful. At the end of the workshop, 9 of the 12 teachers (75%) felt that use of the model had helped them improve the motivational appeal of their instruction.

Why, we wondered, did the ARCS Model work better with the first group, which included several teachers who chose behavior modification problems? In that group, the workshop leader had worked with the school district, and with the same group of teachers, on several other projects during the preceding three
years. The earlier projects were concerned with helping the teachers learn to use systematic development and research procedures for creating and validating instructional improvement projects in the areas of curiosity and cognitive problem-solving skills.

In the second group, most of the teachers had not had an inservice training program in many years, and some had never had one. Consequently, these teachers were starting from “scratch” in terms of orienting themselves toward a productive experience in the workshop, and toward the specific processes of systematic development. They had to learn the generic problem solving and design processes as represented in the specific context of the ARCS Model, and the content of the model itself. Furthermore, these teachers had to work independently during the four weeks between sessions. They could not get immediate personal advice from the workshop leaders because of the distance to their work location, and they did not mail materials to the workshop leaders for review as they had been invited to do. In summary, this group chose too many problems that, although interesting and important to them, fell outside the scope of the ARCS strategies or the time constraints of the workshop, and they had no prior experience in working independently on instructional improvement projects.

Conclusion

The results of these two field tests provide support for the comprehensibility and utility of the ARCS Model as a means of assisting in the motivational design of instruction, and they illustrate some of the requirements for its successful use. ARCS is a problem solving model, and it does require some time to acquire an understanding of the basic strategies and concepts included in it. If a potential user has never learned to work with a systematic instructional design model, then the concepts of problem identification, solution design, and implementation must be learned in conjunction with the content and processes of the ARCS Model.

Furthermore, care must be exercised in the first step of the application to ensure that participants select problems that are appropriate for the model. These would be problems concerned with the improvement of instruction, and not with changes in the personalities of the students.

A limitation of this study is that even though positive support was found in two different settings and there is research support for the various elements of the model, there were many uncontrolled aspects to the field tests. For example, the author of the model was involved in both studies. A more objective test of the model would result from having trainers other than the author. More objective measures of the effectiveness of the model could also be used. For example, a checklist of motivational characteristics applied to preworkshop samples of materials developed and taught by the participants could be compared to postworkshop samples. And, it is essential that several replications of the study be conducted to test for consistent results. This type of action research can never be highly controlled, and the dynamics that can develop in any given group can have a strong influence on the outcomes. Given the initially positive responses to the model, more controlled studies of its critical attributes and areas of effectiveness appear to be warranted.


Mager, R. F. (1968). Developing attitude toward learn-
Author Note. The author gratefully acknowledges the contributions of Bernard Dodge, Bonnie Keller, and Fulya Sari to the development of the strategies included in the ARCS Model, and to Roger Kaufman for his careful review of a draft of this paper.
LOS ANGELES COMMUNITY COLLEGE DISTRICT

Report on Conference Attendance

Jessica Drawbond  
Name of Employee

English Instructor  
Position or Subject

Students in Transition  
Name of Conference

From 10/20/2013  To 10/22/2013  Westin Atlanta, GA

Dates of Conference  
Location

Summarize briefly the information you obtained by participating in this conference which would be of particular interest to you and/or other employees in your area. (Use additional pages if necessary).

The main focus of this conference was how to help students who are transitioning into college or students who are making transitions in college in other ways. This will be very helpful for me in my work with the Freshman Year Experience. The students in the FYE program are new to the college environment, and this conference provided me with techniques for making this transition easier.

Additionally, I was able to attend a session that covered how to reach multicultural males and another that gave a model for stretch courses in English.

Finally, I attended a very useful session that dealt with using brain-based learning in the classroom and dealing with students' use of technology in and out of the classroom.

How has this information been communicated to other staff members in your area?

Ms. Lam, the Coordinator of the FYE program, Christopher Page, and I have all been talking about what we learned at the conference. Also, I have already discussed the stretch class model for English with my department chair, and we are going to look into this further.

Would you recommend staff participation in this conference if it were to be held again in the future?

Yes, especially for staff and faculty working with the FYE Program.

Signature - Person attending

Signature – President/Division Head

This form is to be completed and submitted to the college president or division head within ten days after the end of the conference.
LOS ANGELES COMMUNITY COLLEGE DISTRICT

Report on Conference Attendance

Ming-huei Lam
Name of Employee

Coordinator, Freshman Year Experience
Position or Subject

20th National Conference on Students in Transition
Name of Conference

From 10/19/2013 To 10/21/2013
Dates of Conference

Atlanta, Georgia
Location

Summarize briefly the information you obtained by participating in this conference which would be of particular interest to you and/or other employees in your area. (Use additional pages if necessary).

I was inspired by Dr. Mary Stuart Hunter who delivered the keynote address and Dr. Marilee Bresciani who gave the plenary address. Dr. Hunter briefly went over the higher education history and drew out the lessons we could learn on transition fundamentals and success principles. She concluded that we are currently in the “Thriving Era” (deep learning) and institutions have a moral obligation to help students make transition to THRIVE. Dr. Bresciani stressed the importance of “integrative inquiry” (student learning is not a linear model). Her talk was based on her latest research/book, which will be published in 2014. She illustrated that student learning and development is based on integrating known/evidence learning via courses, feel/sense learning via facilitated experiences, and unknown/spontaneous creativity via intentional messy opportunities. One of the discussion questions she raised was “how are you collaborating with each other to implement necessary improvements?” I hope that we, the LASC faculty/staff, can engage in collaborative conversations to collective decide on how to implement necessary improvements to help our students “thrive”.

How has this information been communicated to other staff members in your area?

I have briefly talked to the FYE adjunct counselor and plan to have further discussion with Ms. Drawbond and Mr. Page who attended the conference with me. We will incorporate what we learned from this conference to the future FYE learning communities.

Would you recommend staff participation in this conference if it were to be held again in the future?

Absolutely. National Resource Center on First-Year Experience and Students in Transition generally hosts great conferences, and I will recommend the FYE adjunct counselor and a few other faculty to attend the next conference in February 2014 in San Diego:

Signature - Person attending

Signature – President/Division Head
LOS ANGELES COMMUNITY COLLEGE DISTRICT

Report on Conference Attendance

Christopher Page                      English Instructor
Name of Employee                      Position or Subject

Students in Transition

Name of Conference

From 10/19/2013 To 10/21/2013          Atlanta, GA
Dates of Conference                   Location

Summarize briefly the information you obtained by participating in this conference which would be of particular interest to you and/or other employees in your area. (Use additional pages if necessary).

I attended several sessions that were beneficial to me. In particular, I attended sessions focusing on using “intrusive” support techniques that improve student engagement and retention, a session specializing in ways to engage, encourage, and support multicultural males on campus, and a sessions that shared new “brain-based learning” data and teaching techniques.

How has this information been communicated to other staff members in your area?

I have spoken with other instructors, shared printed materials, and emailed links to pertinent sites and media.

Would you recommend staff participation in this conference if it were to be held again in the future?

Absolutely.

Signature - Person attending

Signature – President/Division Head

This form is to be completed and submitted to the college president or division head within ten days after the end of the conference.
Friday I hit the inky streets. My feet had a heaviness to them. It was the morning of Susie's back surgery. I wasn't so much worried about the surgery itself. After all, the hospital had just been rated the #1 spinal center in Georgia. And I just wanted her angelic smile to replace the grimaces brought on by excruciating sciatic pain after the cyst on her lower spine was excised. You know, a good five mile fast walk does more good for the soul than all the doctors and medicines in the world. But, I didn't know how much of a balm it was to be.

So, there I was, on the back half of my five mile walk, the morning star we call the sun was coming over the horizon, walking up the hill at a good twelve minute a mile clip, putting the ghosts of worry on the run. Then, I saw a sleek young lady coming over the rise approaching me at a good running clip. We passed each other, smiled, gave a slight acknowledging wave, and said a breathy "good morning" to each other. Then, I heard a "Dr. Schmier" from behind and before I knew it, she was walking next to me.

We talked on the walk. "You don't remember me. I'm Alice. I was in your first year history class seven years ago as a freshman."

We started talking. She told me about herself: married, mother, and nurse. I told her I had retired last December 1st, about my writings and travels, about coming out with a book in a couple of months, and care taking of family members over the past six months. When she asked, "How are you these days," I said. "Trying not to think about my wife whose having lower back surgery this morning."

On the move, after I told about Susie's condition and not liking in the slightest seeing her in pain, and hoping--"incysting" the operation rid her of pain--she reached out and softly touched my wet arm. I turned my face towards her. She had a reassuring "all will be well" smile on her face. No words. There was nothing matter-of-fact in either her touch or face. No expected etiquette. Just sincerity. Then, she hit with a ray of light that brought a sweet taste of love to the dawn.

She said something like, and don't hold me to a word for word accuracy. I don't usually carry a stenographer's pen and pad around when I'm on the streets. "I guess it's time to thank you," she said. "Your course was probably the most important one I took in college. It made me the kind of nurse I am today. No, more than that, the kind of person I am today, the kind of wife and mother I am today. I'll say it: you changed my life during those fifteen weeks. You probably don't remember this, but I do. I was confused little freshman. My parents wanted me to go into the family business. I didn't and didn't know what to do. You wrote back to my journal entries. We talked about my future and I told you I want to be like you and you said, 'You've got to walk your own road. Be like you, not me, after you discover who you are.' I told you I wanted to go into a people business and do some good, not just some retail store, so I was looking at teaching and nursing. You told me, and I remember your words exactly, 'If you become a teacher practice "carefull--with two 'L's"--teaching,' but if you decide to become a nurse think of yourself going into 'healthcaring business,' not just the 'healthcare business.' I remember you emphatically saying, 'Whatever you decide to become, don't 'thingify' it. You told me not to lose sight of people, to notice them, to listen to them, just I want others to do with me. I remember you telling me to always observe the golden rule: to treat other, to feel about them, to think about them as I would want them to do the same to me. I thought at the time that you were bringing the church into our class. You told me not to lose the crucial feel, a sense of special presence, for people. How did you say it, 'Never overlook the critical part of whatever I decide to do: the complex, mysterious, sacred, and poetic human being.' I'm not
sure I understood everything you said at the time, but I do now, and I've been doing that ever since in everything throughout my life. I never stop hearing those words every time I enter a room or talk with fellow nurses. Sometimes they and the doctors think I'm a pain, but you taught me that nursing was more than needles, IVs, procedures, charts, treatments, medications, and protocols. It is about people and about first understanding each of them, their fears and hopes; that nursing and education are as much an art and calling as they are know-how; that they're all about the patient or student, not the nurse or doctor or teacher, not the hospital or university, but the patient or, in your case, the student. You taught me by modeling that the art of nursing is love, that how I treat a patient can be just as powerful a medicine as what they swallow or what goes into their veins. What was it you said about a kind word or a soft touch? You were right. Kindness, compassion, tenderness, understanding, respect, and just to sincerely listen are the best comforting things you can give patients. You taught me that they are so vital in what I do. You taught me to be more than technical savvy, as you put it, more than an 'animated hypodermic needle,' but to be 'people savvy' even more. Now, because of you, I don't just focus on doing no harm; I concentrate more on doing good. It's all because of you. So, I just want to say 'thank you, thank you, thank you' for helping me to make myself who I am and will become."

I looked over as beads of sweat poured into my eyes. My vision was blurred, but I saw my vision as clear as a bell. But, before I could say a word, she said with a smile, "You're slowing me up." She turned and continued her run while I continued my walk in the opposite direction.

Alice didn't give me a chance to say anything. Maybe she meant it to be that way. Anyway, she was an added morning star to the sun. And, I felt a comfort in my heart. But, I also began to wonder how many people, in this case teachers and nurses and physicians, are in cardiac arrest. They don't practice with their heart. Why do so many people think they can separate a person's spirit from her or his body, focusing on the latter and ignoring the former, not dealing with the whole human being? Why do so many academics think it's all about, and only all about content, technology, and technique, or what the jargon calls "pedagogy." Suddenly, up popped images of a final plenary at the Lilly-South conference on teaching in February that touted an "new" approach in the classroom called "T-Pack" that was so "people-less." But, that's the rest of the story..
Make it a good day.

-Louis-

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"If you want to climb mountains, don't practice on mole hills" - /

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