

Small Group Learning in an Online Asynchronous Environment

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Abstract

This article reports the results of a study conducted to examine the use of small group learning strategies in an online college course. The study examined the effect of four types of positive interdependence and the affiliation motive on learning and attitude in an asynchronous, collaborative learning environment. Results indicated no significant differences in achievement by type of interdependence, or by affiliation motive. Correlation analysis revealed a significant positive correlation, indicating that participants with higher numbers of interactions attained higher posttest scores. Participants in reward groups had significantly higher agreement with several attitude statements that reflected benefit from working with others and being able to generate better ideas in groups. Furthermore, participants in all three types of structured interdependence, compared to groups with no interdependence, had significantly higher agreement with being able to learn more because team members knew it was their job to contribute to the group work. In addition, participants with high affiliation motive had significantly higher agreement with several attitude statements. Groups with no structured interdependence had the most cognitive interactions, role groups had the most group processing, and reward groups were most off task. Implications for integrating small groups in computer-mediated learning environments are discussed.

Cooperative Learning and Affiliation Motive

Over the past decade, there has been increased interest in using cooperative methods in college classrooms. During the 1990s, more than 170 studies were conducted to examine the influence of cooperative learning on college students and other adult learners. According to Johnson, Johnson, and Smith (1998), the results of this research are impressive when the magnitude of effect sizes in favor of cooperative over competitive and individual methods are considered. However, other researchers have found less success with cooperative learning for enhancing college student performance (Niehoff & Mesch, 1991; Cole & Smith, 1993; Klein, Erchul & Pridemore, 1994; Klein & Schnackenberg, 2000.) Regarding student motivation, some research on cooperative learning suggests that students working in groups are more motivated than those who work alone, but performance in these settings is influenced by one's affiliation motives (Klein & Pridemore, 1992). Cooper (1995) notes that even though the components of cooperative learning have been well defined, systematic research on the efficacy of each is still quite scarce, particularly for college populations.

Distance Learning for Adult Reentry Students

More than 190 traditional institutions are offering accelerated degree programs with evening, weekend, and distance features that cater to working adults (Wlodkowski, Mauldin, & Gahn, 2001). Accelerated programs for adults use far more active and collaborative learning processes than exist in traditional programs (Scott & Conrad, 1991). In the same manner that small groups in campus-based classes help to overcome anonymity (McKinney & Buxton, 1993), small groups in distance education classes may also reduce anonymity and isolation. Research on computer-mediated collaborative learning indicates that it can be as effective (Johnston, 1996) or more effective (Hall, 1997; Naidu et al., 1999; Uribe, Klein, & Sullivan, 2003) than face-to-face collaboration.

In 1999-2000, eight percent of all undergraduates participated in some type of distance education with one-third of those being enrolled in entirely distance education programs (National Center for Education Statistics, 2002). The prevalence of online collaboration in higher education is supported by the increasing availability of technology-mediated instruction and by growing business and industry demands for working in teams (Ben-Jacob & Levin, 1998; McIsaac & Gunawardena, 1996). In light of the mixed findings on what is motivating and constitutes effective instructional strategies for adults, research is needed to clarify the effectiveness of small group learning for adults in an asynchronous environment. The research questions addressed by this study were:

1. What is the effect of type of positive interdependence on achievement, attitude, and interaction behavior for adult reentry students in an asynchronous collaborative learning environment?
2. What is the relationship between affiliation motive and achievement, attitude, and quantity of interaction when adult reentry students use an asynchronous collaborative learning environment?
3. Do positive interdependence and affiliation motive interact to affect achievement, attitude, and interaction behavior for adult reentry students in an asynchronous collaborative learning environment?

Method

Participants were 280 undergraduate business majors enrolled in a required course in management at a private degree completion university for adult learners. Prior to the study, the affiliation scale of the Work Motivation Inventory (Braskamp & Maehr, 1987) was administered to measure affiliation motive. Participants were blocked by high or low affiliation motive, then randomly assigned to one of four small group treatments--role interdependence, reward interdependence, role plus reward interdependence, or no interdependence.

The dependent variables were achievement and attitude. Achievement was measured by individual posttest scores following asynchronous online instruction and practice. Attitude was measured by a survey that assessed student satisfaction and continuing motivation for working in small groups. Interaction behaviors were observed through the text transcripts of group work and qualitatively categorized according to an observation protocol.

Materials

Three instructional units were derived from the required text for this business management class. Each unit included a learning objective, a 500–750 word online lecture with an open-ended discussion starter, and a practice set. The practice set for each unit provided ten selected-response items, including eight items related to concepts and two application items related to a business or adult education scenario.

The instructor notes included a weekly schedule for delivering the sequentially numbered course components. The course components were the individual text -and- graphic files for the lectures, practice sets, and directive communications to the participants.

An interaction checklist was adapted from instruments used to record group interactions (Klein & Schnackenberg, 2000; Cavalier, Klein & Cavalier, 1995; Hall et al., 1988). Adaptations were made to reflect verbal behaviors that are likely to occur and can be demonstrated in an asynchronous collaborative learning environment through text and graphics (Hillman, 1999; Hall, 1997; Kruger et al., 1996). A sample of interaction behaviors from 40 triad learning teams was observed through the text transcripts of newsgroup posts made by participants during group work. A single post made by one student could contain more than one interaction behavior. The interaction behaviors were qualitatively analyzed according to the three categories of cognitive, group process, and off task. Cognitive interactions included statements about course topics, such as discussing content by providing examples or elaborating, asking questions, answering questions, and disputing others' opinions. Group process interactions included statements intended to accomplish a task by interpreting requirements or establishing due dates; managing group behavior by delegating, accepting, or declining responsibility; encouraging team mates; and commenting on the experimental project in which they were participating. Off task interactions included statements about topics not related to this course, such as discussing self or others in a context other than this class and describing events not related to the course. Inter-rater agreement was established at .91.

Procedures

All procedures took place in an asynchronous environment supported by Microsoft® Outlook Express®, which is the usual delivery modality for participants. Features of the user interface and the activities that take place are referenced with names that mimic typical classrooms. For example, when participants “go to class,” they connect to the Internet and gain password protected access to files for their registered course. When participants “speak up in class,” they submit a text message that is displayed chronologically with comments from other class members, available for all to read. The software interface organizes text -and- graphics messages into newsgroups named Main Classroom, Learning Team A, Learning Team B, etc. Furthermore, the software interface indents replies and subsequent comments, creating a visual representation of the interactions taking place. A topic of discussion shown with its associated dialogue is called a *thread*.

Participants communicated with one another by posting a message to either the Main Classroom newsgroup visible to all members of the class, or by posting a message to their Learning Team visible only to the small group members. This action is similar to sending an email message, except that the recipient is a

group of people rather than an individual. Participants were well oriented to using the software interface because it is the primary means of communication for all of their courses. Additionally, participants had been oriented to working in groups during a required course at entry to their academic programs. The instructor posted a script in each triad's newsgroup that provided guidelines for working in their small group. All scripts stated, "Throughout this week, use the lectures and practice sets to prepare for the test." Additionally, in the role interdependence condition, each group of three participants was directed to designate the roles of facilitator, answer drafter, and verifier for the group members. Groups were prompted to rotate roles for each unit. In the reward interdependence condition, each group of three participants was informed that they would receive a 5-point (15%) bonus toward this week's assignment if all members of the group attained a score of 24 (80%) or more. In the role-plus-reward interdependence condition, each group of three participants was directed to designate roles, and was informed of the bonus points for all members of the group attaining a score of 80% or more. In the no structured interdependence condition, each group of three participants was informed only that they should discuss the readings and questions and use the practice sets to prepare for the test.

At the end of the week, the posttest was available for one hour in order to simulate a time-limited classroom setting, rather than an open book test that could be taken at leisure. Participants were told to take the test without using notes or reading materials. At the completion of the posttest, the attitude survey was presented.

Results and Discussion

Achievement

Results indicated no significant differences in achievement by type of interdependence in small group work, or by affiliation motive (see Table 1). Overall achievement was about 71% on the posttest, a score not unexpected for this population. A correlation analysis was conducted to determine the relationship between posttest score and quantity of interactions and revealed a significant positive correlation, indicating that participants with higher numbers of interactions attained higher posttest scores.

Participants in each of the small group conditions performed similarly on the posttest, and there are a couple of possible reasons for this result. Although positive interdependence was structured in various ways in this study, other elements of cooperative learning were present in all treatments. Participants in all small groups had individual accountability and computer-mediated promotive interaction. Furthermore, while group facilitation skills and evaluation of interpersonal and group processes were not specifically directed in the current study, participants had previously been trained on these and other elements of cooperative learning. In fact, all students who enroll at the university where the study was implemented are trained on how to collaborate at the start of their degree program.

The current study points to the challenge of isolating positive interdependence from other elements known to be integral to cooperative learning (Johnson & Johnson, 1998b). Previous research on cooperative and small group learning has focused on comparing individual versus group work, and only recently has the relative effectiveness of various structures of positive interdependence been documented (Jensen, Johnson, & Johnson, 2002). Results suggest that structuring positive interdependence by itself does not affect achievement when college reentry students work in an asynchronous cooperative learning environment.

Secondly, the instructional materials used by participants in all treatment groups were designed with stated objectives and alignment of the lesson content, practice exercises, and posttest. Consideration must be given to Bossert's (1988-89) assertion that researchers comparing individual and cooperative learning do not consistently find differences between these methods when well-designed instructional materials are used. The effect of structuring positive interdependence is likely to be weak when well-designed instructional materials are used.

Posttest achievement may have been improved with the use of specific feedback from the instructor to students. Kruger et al. (1996) found that, in both face-to-face and computer-mediated adult training environments, messages from the expert were rated as most valuable in learning to accomplish the task. Furthermore, specific feedback was more highly rated than global feedback. In the current study, practice exercises were debriefed by group members, but without feedback or remediation from the instructor.

Table 1 Means and Standard Deviations for Achievement Posttest Scores by Small Group Treatments and Affiliation Motive.

	Type of Interdependence				Total
	Role	Reward	Both	None	
Affiliation Motive					
High	22.40 3.49 (n = 35)	21.95 3.80 (n = 38)	20.97 3.87 (n = 41)	20.47 3.66 (n = 30)	21.47 3.76 (n = 144) 72%
Low	21.24 3.48 (n = 38)	20.34 3.77 (n = 35)	21.52 3.49 (n = 42)	20.77 3.37 (n = 30)	21.01 3.53 (n = 145) 70%
All	21.79 3.51 (n = 73) 73%	21.18 3.85 (n = 73) 71%	21.25 3.67 (n = 83) 71%	20.62 3.49 (n = 60) 69%	21.24 3.64 (n = 289) 71%

*Note: Total possible score was 30.

Attitude

Participants in the reward condition had significantly higher agreement with several attitude statements that reflected benefit from working with others, being able to generate better ideas than they could have done as individuals, and the importance of fellow team mates earning a high score (see Table 2). Furthermore, participants in all three types of structured interdependence groups (roles, reward, and roles-plus-reward) had significantly higher agreement with the statement "I was able to learn more because my team members knew it was their job to contribute to the group work," compared to groups with no structured interdependence.

Kagan (1994) describes positive interdependence as the "subjective experience of being on the same side" (p. 129). The finding that participants in the no structured interdependence condition had lower attitude ratings corroborates previous research identifying reward structures that increase the perception of positive interdependence and reduce social loafing (Johnson, Johnson, & Holubec, 1994; Webb, 1997). In particular, the identified reward structures are ones that combine the points attained by each member's contributions, or offer a bonus when all members exceed a standard. Similarly, the reward structure in the current study provided that team members would receive a bonus if each member attained a criterion score.

Furthermore, concern for teammates' success was apparently facilitated by reward structures. Attitude statements regarding the importance of team members earning a high score and every member being highly successful were significantly higher in the conditions of reward and role -plus-reward, compared to the no structured interdependence condition. There is considerable support for this finding, including Slavin's (1991) assertion that group rewards are essential to eliciting concern for group mates' achievement. Previous empirical evidence indicates students' greater willingness to explain the material and ask questions (Cole & Smith, 1993) as well as higher peer evaluations for group members when rewards were used cooperatively rather than competitively (Niehoff & Mesch, 1991).

The effect of role interdependence in this study is demonstrated in the responses to the attitude statement, "I was able to learn more because my team members knew it was their job to contribute to the group work," with role groups having significantly higher agreement than groups with no structured interdependence. Table 2 Means for Attitude Item Responses by Small Group Treatments.

	Type of Interdependence				
	Role	Reward	Both	None	Total
1. I would have enjoyed this activity more if I had worked by myself.	1.78	1.60	1.99	1.70	1.78
2. Working with other students in this type of activity encourages me to stick with my degree program.	2.96	3.35	3.00	2.92	3.06
3. I benefited from working with others during these lessons. *	3.46	3.50	3.42	2.80	3.32
4. As a group, we generated better ideas than we could have done as individuals. *	3.36	3.69	3.40	2.93	3.35
5. At the start of the week, I knew how to interact with my team members.	3.05	3.05	3.09	3.10	3.07
6. I was able to learn more because I knew it was my job to help the other team members understand the material.	3.02	2.83	3.05	2.62	2.90
7. I was able to learn more because my team members knew it was their job to contribute to the group work. *	3.00	3.06	2.98	2.32	2.87
8. In future team activities, I would prefer that each member of my team be assigned specific roles.	3.01	2.59	2.63	2.77	2.75
9. During this week, it was important to me that every team member earned a high score. *	3.99	4.56	4.39	3.75	4.19
10. For these lessons, it was important to me that every member was highly successful. *	4.06	4.59	4.33	3.75	4.20
11. Thinking about my score on the final exam helped me work with the team members.	3.56	3.62	3.56	3.07	3.47
12. In future team activities, I would prefer to work for points based on my team members' performance.	2.26	2.10	2.39	2.00	2.20

Note: Likert type scale for responses consisted of 5 = Very true, 4 = Mostly true, 3 = Moderately true, 2 = Slightly true, 1 = Not true.

*significant at $p \leq .01$

Previous research points to increased learner satisfaction when using defined roles in small group work (Cavalier, Klein, & Cavalier, 1995; O'Donnell et al., 1987).

When differences in attitude are examined by affiliation motive, participants with high affiliation motive had significantly higher agreement with six of the twelve attitude statements. This result may be reflective of a general preference for group work, as noted in previous research on affiliation motive in small group work (Chan, 1980; Hall et al., 1988; Klein & Schnackenberg, 2000; Brewer, Klein, & Mann, 2003). Likewise, high affiliation participants' agreement with attitude statements may be reflective of a personality trait, or predisposition to act cooperatively (McClelland, 1976; Johnson, Johnson, & Smith, 1998a; Huitt, 2001).

Interactions

Overall, individual participants in groups with role-plus-reward interdependence had the highest number of interactions, statistically significant compared to those in groups with only reward interdependence or no structured interdependence. This result supports previous findings from studies using roles and from other studies that investigated the use of rewards. Adults using roles during group work had increased interactions (Cavalier, Klein, & Cavalier, 1995; Klein & Doran, 1999), while college students with implicit incentives for cooperative group work used more elaboration and metacognitive strategies (Karabenick & Collins-Eaglin, 1997). The importance of increased interactions is noted in previous findings that increased collaboration results in better problem solving (Flynn & Klein, 2001; Uribe & Klein, 2003).

Looking at the specific nature of the interactions, there were significant differences in the frequencies of cognitive, group process, and off task interactions among the four treatment conditions (see Table 3). Groups with no structured interdependence had the highest number of cognitive interactions, groups with role interdependence had the highest number of group process interactions, and groups with reward interdependence had highest number of off task interactions.

In light of these combined findings, it appears that there is an advantage to using multiple avenues of interdependence for increasing interactions. According to Webb (1997), learning theorists generally agree that students learn most by participating actively in group work. Conversely, passive behavior may have minimal consequences for a group outcome, but is detrimental to individual learning (Webb, 1993). Passive behavior is observed in predictable patterns known as social loafing and free rider and sucker effects (Slavin, 1990; Karan & Williams, 1993).

Implications

The sample in the current study was representative of the target population of adult reentry students, and implications are directed at that group of students. The similar distribution of posttest scores and low variability across all treatment conditions point to a normally distributed population. The median score on the need for affiliation measure was about the same as the average noted for the general adult population.

The attitude findings in this study support the recommendation to use small groups with adult reentry students. Overall, participants did not want to work alone, as evidenced by the low agreement across all groups with the attitude item, "I would have enjoyed this activity more if I had worked by myself." This preference for group work, even when there is no increased achievement, has been previously demonstrated in other studies (Palinscar & Brown, 1989; Klein & Pridemore, 1992; Thompson & Scheckley, 1997; Klein & Doran, 1999; Brewer, Klein, & Mann, 2003).

The positive relationship of interactions and achievement was established in this study. On the one hand, high interactivity may be a feature of top performing students. On the other hand, the importance of interactions may be even greater in an asynchronous computer-mediated environment compared to a face-to-face classroom (Gunawardena, 1995; Bailey & Luetkehans, 1998). In the absence of visual, auditory, and tactile communication cues, text based interactions constitute the entirety of online class communication (Hsu & Sammons, 1998). Given that interactivity is a vital component of asynchronous classrooms, educators and instructional designers should provide structures that maximize meaningful exchanges among participants.

Beyond merely increasing the frequency of interactions, consideration should be given to the nature of these interactions. In the current study, participants with structured interdependence had better attitudes about learning with the contributions of their team members. The cooperative behavior of taking turns does not exist in an asynchronous environment where the messaging software delivers participants' contributions in the time-stamped order in which they arrived.

Table 3 *Summary of Results on Nature of Interactions by Small Group Treatments.*

Treatment	Result	Interaction	Sample comment
Role	Role interdependence groups had more group process interactions than did reward groups. *	Group Process	I'm not sure if we are going to be able to count on a third team member. Let's proceed as follows. Whether we get a response from R. or not we need to complete all questions, of which 8 have already been verified. Finally, the summary needs to be completed, which I'll do tonight.
Reward	Reward interdependence groups had more off task behaviors than did role and role-plus-reward interdependence groups. *	Off Task	Thanks, J., a lot of rain here also, but my flowers needed it. I'm hoping the humidity drops.
Both	Role-plus-reward (both) interdependence groups had more group process interactions than did the reward group. *	Group Process	Here's my thoughts towards session 2. Open for discussion of course. Please post the unit1 final answers, I didn't quite finish moving my oldest two daughters to Baltimore. I won't be back online until after 6 PM EDT. Thanks in advance.
None	No structured interdependence groups had more cognitive interactions than reward only or role only groups. *	Cognitive	To an outsider, it would seem that you work for a division of XYZ. Not being an expert on XYZ, I know they provide many services, e.g. disaster relief, fund raising. It would be conceivable to consider your organization a functional structure. What do think?

Note: Interactions by 10 triad-groups in each treatment.

* significant at $p \leq .01$

Even when messages are displayed together for a single topic, the synchronous quality of having an utterance associated with the one immediately preceding it, and the feedback loop provided therein, does not exist in computer-mediated communications (Hillman, 1999). Therefore, assigning roles for beginning and ending conversations may be beneficial.

Looking further at the nature of cooperative interactions, it is important that adult learners feel that their efforts during group work were worthwhile. In the current study, participants in reward groups had significantly higher attitude ratings for the item, "As a group, we generated better ideas than we could have done as individuals," compared to those with no structured interdependence. Teachers should provide tasks and sufficient incentives to encourage the type of collaboration that results in valuable contributions.

The finding that participants with no structured interdependence had significantly more cognitive interactions than either role only or reward only is noteworthy for educators. When teachers of adult learners use group work, they should ensure that there is opportunity for students to ask and answer questions within the groups. Moreover, it may be less necessary for an instructor to structure positive interdependence when other elements of cooperative learning are present.

Further Research

Further research should investigate the quantity and nature of interactions in asynchronous, computer-mediated environments. Specifically, studies should be conducted to determine whether increasing interactions, or increasing particular types of interactions, is beneficial to learning and persistence. Future research on affiliation motive in small group work may clarify whether the higher attitude ratings found in this study were reflective of a general preference for group work by high affiliation adults, or if group settings do indeed provide an optimal environment for some learners, but not for others. The current study did not compare group versus individual work in the asynchronous online environment, and this aspect should be examined in future studies, focusing on both achievement and attitude.

Additionally, the use of teacher intervention and feedback during group work should be explored. Although the current study systematically excluded teacher feedback, caution should be used in guarding against the implication that copious student interaction is sufficient. Rather, consideration should be given to the conclusions of Kruger et al. (1996) that the free sharing of ideas that can take place in computer-mediated communication does not exclude the need for expert feedback.

Findings from the current study do not support the assertion that structured positive interdependence can affect achievement in a computer-mediated environment (Jensen, Johnson, & Johnson, 2002), but the body of literature regarding cooperative learning in this medium is sparse. In light of the growing prevalence of online distance programs for adult learners, it is worthwhile to continue exploring whether previous assumptions about cooperative learning in face-to-face environments are replicated in asynchronous, computer-mediated, and distance learning settings. Research of this type may help us better understand the conditions under which cooperative learning is most effective for adults in online environments.

References

- Bailey, M. L., & Luetkehans, L. (1998, August). *Ten great tips for facilitating virtual learning teams*. Paper presented at the 14th Annual Conference on Distance Teaching and Learning, Madison, WI.
- Ben-Jacob, M. G., & Levin, D. S. (1998, August). *Collaborative learning: A critical success factor in distance education*. Paper presented at the 14th Annual Conference on Distance Teaching and Learning, Madison, WI.
- Bossert, S. T. (1988-1989). Cooperative activities in the classroom. In E. Z. Rothkopf (Ed.), *Review of research in education* (pp. 225-250). Washington, D. C.: American Educational Research Association.
- Braskamp, L. A. & Maehr, M. L. (1987). *Work motivation inventory*. Champaign, IL: Metritech.
- Brewer, S., Klein, J. D., & Mann, K. E. (2003). Using small group strategies with adult re-entry students. *College Student Journal*, 37(2), 286-297.
- Cavalier, J. C., Klein, J. D., & Cavalier, F. J. (1995). Effects of cooperative learning on performance, attitude, and group behaviors in a technical team environment. *Educational Technology Research and Development*, 43(3), 61-71.
- Cole, B. C., & Smith, D. L. (1993). Cooperative learning strategies for teaching adult business English. *Journal of Education for Business*, 68(3), 170-73.
- Cooper, J. L. (1995). Cooperative learning and critical thinking. *Teaching of Psychology*, 22(1), 7-8.
- Flynn, A. E. & Klein, J. D. (2001). The influence of discussion groups in a case-based learning environment. *Educational Technology Research and Development*, 49 (3), 71-86.
- Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications*, 1(3), 147-166.
- Hall, D. (1997). Computer mediated communication in post-compulsory teacher education. *Open Learning*, 12(3), 54-56.
- Hall, R. H., Rocklin, T. R., Dansereau, D. F., Skaggs, L. P., O'Donnell, A. M., Lambiotte, J. G., et al. (1988). The role of individual differences in cooperative learning of technical material. *Journal of Educational Psychology*, 80 (2), 172-8.
- Hillman, D. C. A. (1999). A new method for analyzing patterns of interaction. *The American Journal of Distance Education*, 13(2), 37-47.
- Hsu, S., & Sammons, M. (1998, August 5-7, 1998). *The Invisible barriers in teaching at a distance*. Paper presented at the 14th Annual Conference on Distance Teaching and Learning, Madison, WI.
- Jensen, M. S., Johnson, D. W., & Johnson, R. T. (2002). Impact of positive interdependence during electronic quizzes on discourse and achievement. *The Journal of Educational Research*, 95(3), 161-6.

- Johnson, D. W., Johnson, R.T., & Holubec, E. J. (1994). *The nuts & bolts of cooperative learning*. Edina, MN: Interaction Book Company.
- Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998). Cooperative learning returns to college: What evidence is there that it works? *Change*, 30(4), 26-36.
- Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998, February). Maximizing instruction through cooperative learning. *ASEE Prism*, 7, 24-9.
- Kagan, S., & Kagan, M. (1994). The structural approach: Six keys to cooperative learning. In S. Sharan (Ed.), *Handbook of cooperative learning methods* (pp. 115-137). Westport, CT: Greenwood Press.
- Karabenick, S. A., & Collins, E. J. (1997, Summer). Relation of perceived instructional goals and incentives to college students' use of learning strategies. *The Journal of Experimental Education*, 65, 331-41.
- Karan, S. J., & Williams, K. D. (1993). Social loafing: A Meta-analytic review and theoretical integration. *Journal of Personality and Social Psychology*, 65, 681-706.
- Klein, J. D., & Doran, M. S. (1999). Implementing individual and small group learning structures with a computer simulation. *Educational Technology Research and Development*, 47(1), 97-110.
- Klein, J. D., Erchul, J. A., & Pridemore, D. R. (1994). Effects of individual versus cooperative learning and type of reward on performance and continuing motivation. *Contemporary Educational Psychology*, 19, 24-32.
- Klein, J. D., & Pridemore, D.R. (1992). Effects of cooperative learning and need for affiliation on performance, time on task, and satisfaction. *Educational Technology Research and Development*, 40(4), 1042-1629.
- Klein, J. D., & Schnackenberg, H. L. (2000). Effects of informal cooperative learning and the affiliation motive on achievement, attitude, and student interactions. *Contemporary Educational Psychology*, 25, 332-341.
- Kruger, L.J., Cohen, S., Marca, D., & Matthews, L. (1996). Using the Internet to extend training in team problem solving. *Behavior Research Methods, Instruments and Computers*, 28(2), 248-253.
- McIsaac, M. S., & Gunawardena, C. N. (1996). Distance education. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 403-437). New York: Simon & Schuster Macmillan.
- McKinney, K., & Graham-Buxton, M. (1993, October). The use of collaborative learning groups in the large class: Is it possible? *Teaching Sociology*, 21, 403-408.
- Naidu, S., & Oliver, M. (1999). Critical incident-based computer supported collaborative learning. *Instructional Science*, 27(5), 329-354.
- Niehoff, B. P., & Mesch, D. J. (1991). Effects of reward structures on academic performance and group processes in a classroom setting. *The Journal of Psychology*, 125(4), 457-67.
- Palinscar, A. S., & Brown, A. L. (1989). Classroom dialogues and promoting self-regulated comprehension. In J. Brophy (Ed.), *Advances in research on teaching* (pp. 35-71). New York: JAI.
- Scott, P., & Conrad, C. F. (1991). *A Critique of Intensive Courses and an Agenda for Research*. Paper presented at the Wisconsin Univ., Madison. Div. of Summer Sessions and Inter-College Programs, Madison, WI.
- Slavin, R. (1990). Research on cooperative learning: Consensus and controversy. *Educational Leadership*, 47(4), 52-55.
- Slavin, R. E. (1991). Group rewards make groupwork work. *Educational Leadership*, 48(5), 89-91.
- Thompson, C. & Scheckley, B. G. (1997). Differences in classroom teaching preferences between traditional and adult BSN students. *Journal of Nursing Education*, 36, 163-70.
- U.S. Department of Education, National Center for Education Statistics (2002). *The condition of education, 2002 (NCES 2002-025)*. Washington, DC: Government Printing Office.
- Uribe, D., & Klein, J. D. (2003). The effect of case based vs. systematic problem solving in a computer-mediated collaborative learning environment. *Quarterly Journal of Research on Distance Education*, 4(4).
- Uribe, D., Klein, J.D., & Sullivan, H. (2003). The effect of computer mediated collaborative learning on solving ill-defined problems. *Educational Technology Research and Development*, 51(1), 5-19.
- Webb, N. (1993). Group Collaboration in Assessment: Competing Objectives, Processes, and Outcomes. (ERIC Document Reproduction Service No. ED376215)
- Webb, N. M. (1997). Assessing students in small collaborative groups. *Theory into Practice*, 36, 205-13.
- Wlodkowski, R. J., Mauldin, J. E., & Gahn, S. W. (2001). Learning in the fast lane: Adult learners' persistence and success in accelerated college programs (Vol. 4, No.1). Indianapolis, IN: The

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