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Effect of Continuous Improvement Training on Student Interaction and Engagement

Patricia Devlin
University of Toledo

This article describes a preliminary study investigating whether a specific awareness and training for six teacher–paraprofessional teams would have an effect on the inclusion of six students with mild to severe disabilities in elementary general education environments. An experimental design employing a pretest–posttest control group with matched subjects was used to evaluate the effectiveness of training that emphasized the continuous improvement components of teamwork, goal setting, and data collection. Data focusing on student interaction and engagement were collected using MS-CISSAR. Results indicated an increase in teacher interaction and a decrease in paraprofessional interaction with special education students after the training component. Engaged behavior was not found to change noticeably for this group of students. Individual student strategies and benefits are also reported. The article includes a discussion of training format, key elements, and their relationship to long-term systems change.

DESCRIPTORS: paraprofessionals, paraprofessional proximity, teacher interaction, student engagement, team training

Over the past 30 years, students with a wide range of strengths and needs have gained access to the general curriculum through increased inclusive opportunities in general education settings. In the United States, a paraprofessional support model remains a fundamental mechanism to operationalize inclusive school practices for students with more significant disabilities (Downing, Ryndak, & Clark, 2000; Giangreco, Broer, & Edelman, 1999; Giangreco, Edelman, & Broer, 2003; Minondo, Meyer, & Xin, 2001; Werts, Wolery, Snyder, Caldwell, & Salisbury, 1996; Wolery, Werts, Caldwell, Snyder, & Liskowski, 1995). Despite current research focused on the use of paraprofessionals, many in the field continue to struggle with how to include students with severe disabilities in general education environments without over-reliance on paraprofessional support.

The literature within the past 10 years has provided data that need to be considered in the design of inclusive programs. Research has revealed that unnecessary and excessive paraprofessional proximity can establish an adverse dependence on adults and interfere with the interaction between student, general education teacher, and peers (Giangreco, Edelman, Luiselli, & MacFarland, 1997; Marks, Shrader, & Levine, 1999; Shukla, Kennedy, & Cushing, 1999). Issues have been raised concerning this support model (i.e., assigning one-to-one paraprofessional), such as placing the least qualified personnel in the position of providing all or most of a student's instruction (Brown, Farrington, Knight, Ross, & Ziegler, 1999; Giangreco & Doyle, 2002). This common practice was also noted to highly correlate with low or infrequent general education teacher engagement, which could lead to negative consequences such as student isolation, insular student–paraprofessional relationships, and negative student stigma with peers (Giangreco, Broer, & Edelman, 2001; Young, Simpson, Myles, & Kamps, 1997). Conversely, general education teacher engagement has been cited as critical to the appropriateness of placement and contributing to the overall quality of education for students with disabilities (Giangreco et al., 2001; Olson, Chalmers, & Hoover, 1997; Salisbury, Palombaro, & Hollowood, 1993).

In response to these issues, research has recommended that school districts consider alternate models of paraprofessional service delivery (e.g., program based) that include a collaborative effort between the general education teacher, the special education teacher, and the paraprofessional in determining the extent of interaction and support that will be given to a student (Giangreco et al., 2001; Doyle & Gurney, 2000). A schoolwide planning process to improve paraprofessional supports has recently shown promise in improving both adult and student outcomes (Giangreco et al., 2003). The heart of this process involves instructional teams engaging in a problem-solving approach based on identified priorities related to paraprofessional support. We have also seen federal legislation addressing paraprofessional standards and related training requirements (e.g., those in Title I environments). Although much of the literature has indicated the need for increased paraprofessional training opportunities (Wadsworth & Knight, 1996; French & Pickett, 1997; Steckelberg & Vasa, 1998; Parsons & Reid, 1999), there is a caution that general education teachers may

interpret additional training as further justification in stepping away from students with disabilities (Giangreco et al., 2003). Prior advice concerning paraprofessional training has warned that training *only* to paraprofessionals is not sufficient and may foster a lack of general education teacher interaction. The literature and practical resources recommend the simultaneous training or teaming of paraprofessionals and teachers to promote collaborative working relationships and address the lack of paraprofessional supervision in the classroom (Doyle, 2002; Morgan & Ashbaker, 2001; Marks et al., 1999).

Research indicates that traditionally, when including students with more significant support needs, daily collaborative problem solving begins with the general education teacher and paraprofessional, and when necessary branches out to the special education teacher and related service personnel (Coots, Bishop, & Grenot-Scheyer, 1998; Snell & Janney, 2000). The current study addressed the need to offer those individuals providing direct support to students (i.e., general education teachers and paraprofessionals) with a simple procedure within their means that would enhance the quality of a student's education. The technique highlights a framework for continuous improvement found in the school improvement literature implemented in a change/communication model. Continuous improvement has been described as results-oriented action research that encourages change and improvement. Schmoker (1999) endorsed three concepts that constitute the key to continual improvement: (1) meaningful, informed teamwork; (2) clear, measurable goals; and (3) the regular collection and analysis of performance data. He stated that improved quality can be obtained through emphasis on a process of teamwork and data-based decision making—a process that produces evidence that something did or did not work. It was theorized for this investigation that *meaningful* training leading to continuous improvement would involve teaching direct support personnel to engage in a cycle of planning, acting, observing, and reflecting.

The current study was conducted in a rural Midwestern school district, where lack of qualified special education teachers had become a persistent problem. During the 2001–2002 school year, 36% of special education staff maintained temporary or emergency certification concurrent with an increased enrollment of special education students. The district was also experiencing increased employment of paraprofessionals supporting students with varied needs in general education settings. Administrative concern regarding lack of appropriate supervision and training opportunities for this group of personnel prompted the Coordinator of Special Education to initially assess paraprofessional utilization. Overall observations revealed that for students with more severe disabilities, there appeared to be limited general education teacher interaction and ongoing paraprofessional proximity with students while in inclusive settings. These observations also suggested that many paraprofessionals were assuming primary responsibility for student work content and behavior. Additional initial conversations with general education teachers acknowledged minimal time for collaboration with special education teachers and overall lack of knowledge, as one teacher stated, "to do it right."

Recent literature has emphasized the need for and importance of continued research linking efforts to enhance those supporting students with disabilities with student outcome data. Although interaction and engagement cannot be considered direct student-learning outcomes, it is noted that student engaged behavior has been described as an alternative for direct assessment and an indicator of academic gains for students with mild disabilities (Bulgren & Carta, 1993; Sindelar, Smith, Harriman, Hale, & Wilson, 1989). The current study adds to the body of paraprofessional literature by offering an experimental investigation of a training model designed to alter adult and student behaviors that influence the likelihood of increased and cumulative gains for students with disabilities. More specifically, it offers a model with the potential to alter traditional patterns of interaction between students with disabilities and classroom staff. The investigation addresses the ongoing issue of over-reliance on paraprofessional support and lack of paraprofessional supervision noted in the literature. The training format also promotes a model for on-the-job training recognizing efficiency and meaningful training in inclusive environments.

This preliminary study was designed to assess the effects of a continuous improvement training technique on both adult and student behavior. Specific behaviors included adult–student interaction and student engagement. The hypothesis tested purported that instructional teams participating in the training component would experience an increase in teacher–student interaction and a decrease in paraprofessional–student interaction. Additionally, it was hypothesized that student engaged behavior would not be altered as a result of the change in adult interaction. Prior research (McDonnell, Thorson, McQuivey, & Kiefer-O'Donnell, 1997) found no significant difference in student academic engagement between student groups receiving paraprofessional support for instructional activities and those receiving support from peers and the general education teacher in inclusive environments. In the current investigation it was also important to gather participant feedback on the ease and acceptability regarding the use of training components.

Method

Design and Measurement System

To examine the training effect, an experimental design using a pretest–posttest control group with

matched subjects was used. Over a 5-week period, initial pretest data designating interaction and engagement were collected for each student in both experimental and control groups. Subsequently, teacher–paraprofessional teams in the experimental group participated in a three-phase training format that highlighted a continuous improvement technique. Posttest observations of both groups began after the 3-week diffusion or application phase and continued for 5 weeks. At the conclusion of observational data collection, participants in the experimental group submitted completed goal sheets and observation forms. These participants were also asked to complete a feedback survey and written evaluation based on their experience.

Data were collected using MS-CISSAR (Greenwood, Carta, Kamps, & Delquadri, 1997), a software package designed to assess the relationship between student, classroom, and teacher variables in a mainstream environment. This observational tool was well matched with the research objectives in this study and corresponded to one of its intended uses—to record change in classroom, teacher, or student variables as a function of experimental manipulation (Greenwood, Carta, Kamps, & Arreaga-Mayer, 1990). The program uses a 1-minute momentary time sampling procedure consisting of three 20-second cycles in which student behavior, teacher behavior, and classroom ecology are recorded. The selection of relevant variables from the MS-CISSAR taxonomy is routinely reported in the literature. Specific categories from the standard 99-event taxonomy were selected for analysis related to the research questions under investigation.

Group Matching and Random Assignment

Within four elementary schools, an initial pool of students was identified consisting of students with mild, moderate, and severe disabilities included in general education settings with paraprofessional support on a consistent basis. Students spent varying degrees of time in general classrooms based on educational team determination of least restrictive environment. General education teachers initially supplied information on the nature of the inclusive setting (e.g., student participation, paraprofessional responsibilities) and identified student strengths and needs in the classroom. Teachers were asked to choose the primary student characteristic that inhibited fuller student integration in this environment from one of the following areas: communication concerns, cognitive issues (e.g., low academic functioning, cognitive processing deficits), or behavioral problems. After obtaining this pool of students, the investigator used matching as an attempt to control for individual differences. Matched pairs of students were formed based on variables that appeared to be highly correlated with interaction and engagement: (1) intellectual level and (2) disability characteristic or adaptive behavior identified as having a potential impact on integration in general education. From the initial pool, six matched pairs were identified and characterized a purposeful sample of elementary students with more severe disabilities in this district attending general education settings with consistent paraprofessional support. The members of the matched pairs were then randomly assigned to either the control or experimental group. Random assignment resulted in mixed groups of students from various elementary buildings accounting for variables of age and building culture.

Participants

Demographic information about the paired participant students is shown in Table 1. The 12 participants were 2 girls and 10 boys, ranging in age from 5 to 11

Table 1
Participant Demographics: Experimental and Control Student Pairs

Student	IQ[a]	Primary characteristic hindering integration[b]	Age[c]	Grade	Gender	Disability label[d]	General education class/ minutes per week
$Andrew_1$	50	Communication concerns	9, 2	3	Male	A	Language Arts/225
$Drew_2$	40–50	Communication concerns	9, 10	3	Male	A	Science–S. Studies/360
$Glenn_1$	<30	Cognitive issues	7, 4	2	Male	CI	Music/60
$Josie_2$	40–50	Cognitive issues	8, 7	3	Female	CI	Physical Education/60
Ben_1	60–70	Cognitive issues	11, 1	4	Male	A	Spelling–Science/300
BK_2	60–70	Cognitive issues	7, 4	2	Male	A	Language Arts/220
$Chelsea_1$	59	Behavioral problems	10, 3	3	Female	CI	Calendar–Math/450
$Nathan_2$	57	Behavioral problems	7, 10	2	Male	A	Language Arts/320
$Luke_1$	70	Behavioral problems	5, 4	K	Male	CI	Pre-reading–Free play/220
$Austin_2$	68	Behavioral problems	7, 2	1	Male	CI	Reading Appreciation/300
$Duncan_1$	68	Cognitive issues	6, 3	K	Male	A	Reading Appreciation/200
$Adam_2$	70	Cognitive issues	7, 7	1	Male	A	Calendar–Reading/250

Note: $_1$ = student in experimental group; $_2$ = student in control group.
[a] According to school district assessments and state guidelines.
[b] According to general education teacher.
[c] At beginning of data collection period: years, months.
[d] A = Autism, CI = Cognitive Impaired.

years, who were integrated in kindergarten through fourth-grade classrooms in four elementary schools. Classification of cognitive level (IQ range ~30–70) was based on standardized intelligence tests, adaptive behavior evaluations, and developmental scales administered by professional support personnel. For a number of students a range of cognitive ability is evident due to the fact that many standardized tests require a response repertoire difficult for some students (e.g., receptive and expressive language, reciprocal social interactions). Seven of the 12 participants were identified as students with autism, 4 of the participants had cognitive impairment ranging from the mild to severe range of intellectual functioning, and 1 student had multiple impairments. In half of the matched pairs, teachers recognized cognitive issues (low cognitive level/cognitive processing deficits) as a potential inhibitor to integration, with behavior and communication issues also recognized in the sample. Table 1 also shows the content class and the amount of minutes per week students in both groups were included in a particular general education setting.

Twelve teacher–paraprofessional teams ($N = 24$) from the four elementary schools participated in control and experimental groups. The 12 paraprofessionals did not have formal training in the area of disabilities and had worked as teacher assistants in education an average of 7 years. Many of the 12 paraprofessionals were based in self-contained classrooms and at designated times supported individual students in general education environments. Teaching experience of the 12 participant teachers ranged from 6 to 17 years, with a mean of 9 years. They were classroom and special area (e.g., physical education) teachers that included a range of 23 to 28 students per classroom.

Procedures

Observations took place in 12 general education classrooms during an identified block of time during which the target student was present. Data collectors collaborated with general education teachers at the beginning of each week to determine continuity in classroom schedule. Observations reflected the typical activity during the scheduled time (e.g., math, center activities, music) and took place only when both adult participants and the target student were present. General education teaching procedures and paraprofessional support patterns were typically similar for the same block of time (e.g., type of instructional group and paraprofessional support or routine during the math block were similar every day). Table 2 shows the number of observations, mean observation length, and number of coded intervals for each student pair (experimental/control) in both pretest and posttest phases. The 12 students were observed an average of 3 hours (range 2.5–3.2 hours) in the pretest phase and an average of 3 hours (range 2.5–3.4 hours) in the posttest phase. Of total observations ($N = 90$), experimental students were observed an average of 3.6 sessions across pretest ($N = 22$) and posttest ($N = 22$) stages. Control group students were observed an average of 3.8 sessions across pretest ($N = 23$) and posttest ($N = 23$) stages. Observation duration per session averaged 49 minutes for experimental students and 48 minutes for control group students across pretest and posttest phases.

Initially, the primary investigator received 2 days of training in the use of MS-CISSAR at Juniper Gardens Children's Project, University of Kansas. Training consisted of approximately 30 hours of instruction and included memorization of definitions, coding videotapes of classroom situations, and observations in classrooms. She subsequently trained two professional staff members (psychologist, social worker) to use the software program until they achieved 90% agreement with each other and the initial trainer across three consecutive 30-minute sessions. During the investigation, data col-

Table 2
Observation of Student Pairs

	Number of intervals		Total observations		Observation length	
Student	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
Andrew_1	192	202	4	4	$M = 48$	$M = 50.5$
Drew_2	182	182	4	4	$M = 45.5$	$M = 45.5$
Glenn_1	188	190	4	4	$M = 47$	$M = 47.5$
Josie_2	176	194	4	4	$M = 44$	$M = 48.5$
Ben_1	168	164	3	3	$M = 56$	$M = 54.7$
BK_2	187	172	4	4	$M = 46.8$	$M = 43$
Chelsea_1	186	184	3	3	$M = 62$	$M = 61.3$
Nathan_2	180	176	4	4	$M = 56.6$	$M = 55$
Luke_1	160	164	4	4	$M = 40$	$M = 41$
Austin_2	152	150	3	3	$M = 50.6$	$M = 50$
Duncan_1	166	160	4	4	$M = 41.5$	$M = 40$
Adam_2	172	180	4	4	$M = 43$	$M = 45$

Note: $_1$ = student in experimental group; $_2$ = student in control group.
Observation length = minutes.

lectors coded both experimental and control groups and were told simply that the current study was to explore student behavior.

Interrater reliability was computed for 10% of the total observations ($N = 90$), in which all observers examined target student participants. These included four observations in the pretest phase involving different target students across conditions (experimental = 2, control = 2). The remaining five reliability sessions were conducted during posttest observations and included different students across conditions (experimental = 3, control = 2). MS-CISSAR software calculates a kappa statistic for each category of variable and for the overall observations (Greenwood et al., 1997). The mean kappa statistic was 0.882 (range 0.821–0.911). Because a kappa value of 0.60 or larger is typically considered acceptable, these results indicate a high level of agreement between raters during coding probes.

Dependent Variables

The dependent variables (a) teacher–student interaction, (b) paraprofessional–student interaction, (c) engaged student behavior, and (d) nonengaged student behavior were operationally delineated by the MS-CISSAR assessment tool. Table 3 lists the categories of MS-CISSAR codes used for the current study. For the purposes of this investigation, specific codes from the Teacher Definition and Teacher Focus categories were combined to form the interaction variable. "Teacher Definition" refers to the primary adult or other person teaching or providing the most immediate cue for the target student to respond. If no instruction was noted, then the adult closest to the student was coded as the teacher. "Teacher Focus" specifies to whom the teacher's instruction is directed. "Target Only" was defined as the teacher's visual, physical, or verbal attention focused directly on the student with disabilities. "Focus on Target and Others" was defined as the teacher's visual or verbal attention generally focused on a small or large group that included the student with disabilities. A combination of these two categories provided a descriptive picture of the primary person with whom the target child was interacting and the primary recipient(s) of the interaction.

Table 3
Categories from MS-CISSAR

Interaction variables	MS-CISSAR codes
Teacher–student interaction	Teacher Definition (Regular), Teacher Focus (Target, Target + Others)
Paraprofessional–student interaction	Teacher Definition (Aide/Para), Teacher Focus (Target, Target + Others)
Engagement variables	**MS-CISSAR codes**
Engaged behavior	Academic Responses (Writing, Task Participation, Read Aloud, Read Silently, Talk Academic)
Non-engaged behavior	Task Management Responses, Competing Responses (Manipulate Materials, Move, Talk Management, Attention, Aggression, Disrupt, Talk Inappropriate, Look Around, Noncompliance, Self-Stimulation, Self-Abuse)

Within the Student Response category, engaged behavior was defined as Academic Responses (Writing, Task Participation, Read Aloud, Read Silently, Talk Academic) that involved active student responses (written, oral, visual, or motor) made directly to an academic task, command, or prompt. Consistent with prior research using MS-CISSAR, student behaviors from the Task Management category (raising hand, moving materials around, moving around the room, talk management, and attending) were combined with behaviors from the Competing Behaviors category (Aggression, Disrupt, Talk Inappropriate, Look Around, Noncompliance, Self-Stimulation, Self-Abuse) to form the nonengaged dependent variable. These behaviors are not considered engaged behaviors (Greenwood et al., 1990; Kamps, Leonard, Dugan, Boland, & Greenwood, 1991) because it is not possible to ascertain whether students are actively processing information.

Experimental Group Training

Achilles, Reynolds, and Achilles' (1997) three-stage communication/change model provided the structural format for the team training entitled *Strategies for Student Success* (Devlin, 2000). This model is based on the assumption that teaching or training is a form of purposeful communication producing change. A training plan using strategies that parallel the three stages (i.e., Dissemination, Demonstration, Diffusion) should generate acquisition of knowledge and skill development, resulting in learning (Achilles, Dickerson, Dockery-Runkel, Egelson, & Epstein, 1992). The outcome of learning in this model is equivalent to a change in adult behavior.

The three training phases (Dissemination, Demonstration, Diffusion) encompassed 16.5 school days during the second half of the academic calendar year. During that time period, experimental-group instructional teams participated in 1.5 days of direct instruction, and more importantly, 3 weeks of guided teaching in how to implement the content learned into their classrooms. The theoretical framework and specific topics related to the structure are shown in Table 4. Facilitators of all three phases included the Coordinator of Special Education and related service personnel (speech pathologist, teacher consultant) who provided ongoing support services from the county intermediate school district.

The initial stage, dissemination, focused on conceptual knowledge and included awareness and conscious-

Table 4
Framework of Training Component: Strategies for Student Success

Change model	Dissemination	Demonstration	Diffusion
Time	3 hours	5 hours	3 weeks
Key Elements	Informed Teamwork • Inclusion–underlying principles • Student interdependence • Teacher engagement • Paraprofessional support • Current research • Benefit of teamwork	Goal Setting • Research strategies/strategy sharing • Selection of student goal • Teacher–Para Action Plan	Application of Key Elements • Coaching • Consulting
	Small Group Activites • Collaboration and teamwork • Communication styles • Teamwork components • Identifying natural supports	"The Cycle" • Data Collection–observation form • Team Reflection • Practice with vignettes • Continuous cycle	

ness-raising activities in a 3-hour session. The six teams initially considered the rationale for inclusion of students with severe disabilities alongside their nondisabled peers (e.g., legal, moral, and educational grounds) and the benefits that exist for both groups of students. Access to the general curriculum was defined in terms of both formal and informal components and experiences. Informal components included student interdependence in the general education environment, contributing to the quality of education received and also quality of life. Student interdependence was further defined as academic and/or social interaction with both natural and formal supports in the classroom (e.g., teacher, students, paraprofessional). Facilitators highlighted the need to recognize the value of the "4th R"—reading, writing, arithmetic, and relationships that include important related skills (e.g., communication, cooperation) within the classroom.

Research on teacher engagement with special education students supported by paraprofessionals in general education classrooms (Giangreco et al., 2001) was introduced, including barriers that hindered this critical element from happening. The discussion expanded to an appreciation of the evolution of paraprofessional personnel, their importance in the best practice of inclusion, as well as cautions noted in previous research with an assignment of one-to-one support (Giangreco et al., 1997; Marks et al., 1999; Shukla et al., 1999). The influence of adult behavior on student behavior and the use of natural supports were embedded in activities. Teachers and paraprofessionals were also introduced to the idea of functioning as a classroom team during their integrated time, a notion that was foreign to some. Teams engaged in various teamwork activities that focused on the benefits of teamwork and collaboration (Doyle, 2002; Morgan et al., 2001). This segment focused on the benefits of working together with other adults in the classroom, recognizing diverse communication styles and impact on team effectiveness, recognizing issues that create conflict within teams, and essential components of successful collaboration.

The second stage, demonstration, included the six instructional teams and encompassed 5 hours of training on a subsequent day. This session focused on skill building and decision-making activities marked by two-way communication. Facilitators began by presenting successful research-based strategies recognized to foster student communication and collaboration (e.g., cooperative learning, collaborative problem solving, use of communication prompts) through a case-study method. Participants shared successful and unsuccessful strategies they had used over the years in their classrooms. This initial segment culminated with each team's identification of a specific student goal that could lead to increased student interdependence in their environment. Teams were guided through a process of goal selection, strategy brainstorming and selection (transforming the goal into measurable adult and student actions), and observation focus (defining observable information they needed to evaluate the effectiveness of their strategy). This resulted in a team action plan that clearly delineated both adult and student actions. A second key factor involved introducing an observation form that provided a simple means of obtaining data of the observation focus (Morgan et al., 2001). It was important to emphasize that the data collection phase did not include interpretation or evaluation but simply recording either student or adult actions. With the assistance of video classroom vignettes, participants practiced observing and documenting both student and adult actions using the simple observational tool. Team reflection was also introduced and practiced. It was essential that teams understood the importance of exchanging perceptions by examining their data and brainstorming adjustments toward their goal. Implications surrounding the team's ability to collaboratively reflect (e.g., when, amount of time) were also discussed in the training session. At the conclusion of this seg-

ment, teams had conceptualized their student strategy and were familiar with the continuous observation–reflection cycle needed to document strategy effectiveness.

The final stage of training (diffusion/application) was characterized by skill transfer in which individual teacher–paraprofessional teams implemented the observation–reflection cycle within their classrooms. For 3 consecutive weeks after the 8 hours of instruction, training facilitators were available to coach and consult with individual teams. In relation to adult change, this phase offered two-way communication between facilitators and participants on an interpersonal level pertaining to the key elements previously taught. During this time facilitators initially confirmed that the accommodations necessary to implement their strategy were obtained, offered resource recommendations, and at times assisted teams with creation of materials (e.g., social stories). Facilitators also observed the teams gathering student data and answered questions regarding the continuous improvement cycle and strategy implementation.

Facilitators were instructed to address both teachers and paraprofessionals regarding implementation and progress, which mainly occurred on an individual basis. They answered questions related to the completion of observation forms and barriers encountered in strategy implementation (e.g., acquisition of materials). Most often the facilitators served as a sounding board for teams initially implementing and adjusting their strategy. During this time, the lead facilitator also offered verbal reinforcement for teacher and paraprofessional teamwork.

Data Analysis

Dependent measures were the percentage of intervals used to describe (a) teacher–student interaction, (b) paraprofessional–student interaction, (c) engaged student behavior, and (d) nonengaged student behavior. Group means and standard deviations for the four dependent variables are presented in Table 5. Quantitative data were analyzed using SPSS PC+ (SPSS Inc, Chicago, IL). Initially, two repeated-measures MANOVA tests were conducted to test the effect of treatment on a linear combination of dependent variables (teacher–student interaction and paraprofessional–student interaction; engaged behavior and nonengaged behavior). "MANOVA works best with highly negatively correlated dependent variables" (Tabachnick & Fidell, 2001, p. 357). In this investigation, there was a high negative correlation of engagement variables ($r = -0.820$) and a moderate to strong negative correlation of interaction variables ($r = -0.601$). Follow-up analyses (repeated-measures ANOVAs) were conducted including only those effects that were significant at the multivariate level.

To gain a clear picture of how instructional teams applied key elements from the training, supportive data for each student in the experimental group were obtained and analyzed from submitted team goal and strategy sheets, total classroom observation forms, and anecdotal observations from participants. Feedback data were also collected from teacher and paraprofessional teams in the experimental group. At the conclusion of the study, each participant completed a Likert rating scale and written evaluation assessing perception of effectiveness and use of key training elements.

Table 5
Mean and Standard Deviation of Dependent Variables

Dependent variables	Pretest		Posttest	
	M	*SD*	*M*	*SD*
Teacher–student interaction				
Control	28.93	18.17	28.31	15.97
Experimental	20.60	14.37	38.86	18.42
Para–student interaction				
Control	42.11	18.06	37.36	19.00
Experimental	42.51	16.78	14.96	7.52
Engaged behavior				
Control	38.88	11.78	40.91	12.11
Experimental	43.96	17.32	44.95	15.52
Non-engaged behavior				
Control	75.98	15.16	73.01	12.47
Experimental	56.45	21.77	61.53	15.13

Note: $n = 6$ for experimental condition, $n = 6$ for control for all analysis.

Results

Student Interaction

MANOVA predictors for interaction data included time, condition, and interaction source (teacher/paraprofessional). Quantitative results of the repeated-measures MANOVA for interaction data revealed a significant three-way interaction (F (1,10) = 26.801, $p < 0.001$) of interaction source. The significant three-way interaction suggests that the students' interactions differed by condition across time as a function of teacher versus paraprofessional interaction.

To better understand this three-way interaction, two follow-up repeated-measures ANOVAs were conducted separately for teacher–student interaction and paraprofessional–teacher interaction. For teacher–student interaction there were significant effects of time (F (1,10) = 23.65, $p < 0.05$) and a significant time × condition interaction (F (1,10) = 27.07, $p < 0.05$). Overall, across both conditions participant students had fewer teacher–student interactions at the pretest measure (M = 24.76, SD = 16.21) than posttest (M = 33.59, SD = 17.33). As expected, teacher–student interaction was increased in the experimental condition and remained the same in the control condition. The average number of teacher interactions significantly increased from pretest condition to posttest condition for participants involved in training (see Table 5). In com-

parison, the average number of teacher interactions remained similar from pretest to posttest conditions for the control group.

The univariate analysis also indicated statistically significant effects of time (F (1,10) = 13.88, $p < 0.05$) and time × condition (F (1,10) = 6.91, $p < 0.05$) for the paraprofessional–student interaction variable. On average, across conditions participant students had more paraprofessional interaction during the pretest measure (M = 42.31, SD = 16.62) than the posttest measure (M = 26.16, SD = 18.07). Consistent with the initial hypothesis, paraprofessional–student interaction changed for the experimental group but not for the control group. From the pretest to the posttest measure, the average number of paraprofessional interactions significantly decreased for instructional teams participating in the training component (see Table 5). For the control group, the average number of paraprofessional interactions was similar from pretest to posttest observations.

Student Engagement

MANOVA predictors for engagement data included time, condition, and student behavior (engaged and nonengaged). The repeated-measures MANOVA for student engagement data revealed a significant difference between nonengaged and engaged behavior (F (1,10) = 0.285, $p < 0.001$), but there were no significant effects of time or condition and no significant interactions among any of the independent variables. This suggests that the effect of the treatment did not vary in terms of engaged or nonengaged behavior. Although average overall nonengaged behavior was consistently greater than student engaged behavior, there was not a significant difference in either group from pretest to posttest conditions.

It was theorized that student engaged and nonengaged behavior, as defined in this study, would not be affected by changes occurring in teacher–student or paraprofessional–student interactions. Based on collected data, students in the experimental group maintained their level of engagement with noted decreased paraprofessional interaction and increased teacher interaction. Closer examination of the two subcategories combined to create the nonengaged category (Task Management, Competing Response) revealed that there was an overall change in competing response data. Responses for the control group typically remained the same (pretest = 14.12%, posttest = 10.29%), but a noticeable reduction in competing responses was noted for the experimental group (pretest = 23.39%, posttest = 9.95%).

Supportive Documentation

The experimental group completed an average of 5.3 observation–reflection cycles and submitted six team goal sheets and 33 observation forms at the conclusion of the study. Data indicating student goals, selected strategies, and adult actions used by the teacher and paraprofessional before and after implementation are summarized in the Appendix. Completed forms indicated that the paraprofessional had the responsibility for data collection during posttest observations 84% of the time. The majority of student goals focused on appropriate participation and academic involvement in the same or similar classroom activity. Only one team chose a goal that strictly pertained to the social integration of target student with nondisabled peers.

Strategies chosen to accomplish goals varied with instructional teams, although some commonality was noted. For three students, team strategies included an increase in teacher proximity during designated classroom time. As a result, teacher actions were altered in activities that included direct student instruction and communication. Additional instructional strategies included individualized planning for student participation (Glenn) and alternating teacher and paraprofessional activities in a reading center (Andrew). Four instructional teams created visual prompts implemented by the teacher, peer, or target student. In some instances the visual promoted self-regulation in an independent work situation (Andrew, Ben) or signaled a transition of activity (Chelsea, Luke). Team strategies also included the use of social stories that promoted expected behavior. These stories encouraged in-class student participation and were mainly prompted by paraprofessionals at the beginning of the inclusive activity. Two teams chose peer-related strategies (collaborative problem solving, peer buddy, and peer instruction), two facilitated by paraprofessionals and one implemented by the classroom teacher. Two additional changes in paraprofessional behavior were frequently noted after strategy implementation; actions included distancing themselves from the target student and providing assistance to additional students in the classroom.

Social Validity

The social validity of the training was assessed through completed surveys and written evaluations by participant classroom teachers and paraprofessionals. Results related to the acceptability and effectiveness of implementing training components in the context of the general education classroom are shown in Table 6. Results indicated that participants liked the teamwork, goal-setting, and reflecting components of the continuous improvement cycle slightly better than the observation component. Both groups of participants found the process to be an appropriate and acceptable strategy in the general education classroom. Further analysis of this question revealed that the average paraprofessional rating (1.8) was higher than that of general education teachers (2.6). Generally, teams felt the process was effective in fostering interdependence for the target special education student. Teams used the obser-

Table 6
Average Ratings of Participant Feedback Survey

Question	Rating scale and mean ratings 1	2	3	4	5
1. How well did you like using components of the continuous improvement cycle?[a]					
■ Teamwork	1.0				
■ Goal setting	1.4				
■ Observation			2.1		
■ Reflection		1.6			
2. How appropriate is this strategy in the general education classroom?[b]			2.1		
3. How effective was this strategy in fostering interdependence for the target student in your classroom?[c]		1.9			
4. Will you continue to use this strategy as a teacher–paraprofessional team?[d]		2.0			

[a] Rated on a 5-point scale ranging from *a lot* (1) to *not at all* (5).
[b] Rated on a 5-point scale ranging from *very appropriate* (1) to *very inappropriate* (5).
[c] Rated on a 5-point scale ranging from *very effective* (1) to *very ineffective* (5).
[d] Rated on a 5-point scale ranging from *very much so* (1) to *not at all* (5).

vation/reflection cycle an overall average of 1.3 days per week and indicated that they would continue to use the process. Comments involving the process noted the benefits of working as a team and reflecting on progress toward a student goal that was meaningful in the context of the classroom. Two participants commented on the positive effect their particular strategy had on peer interaction with the target student. Teacher comments included the benefit of directing paraprofessional support to numerous students in the classroom, and learning additional strategies focused on the target student. Paraprofessionals said they enjoyed the responsibility of working with additional students in the classroom and expressed satisfaction with increased interaction between the teacher and the target student.

Discussion

The results of this study provide support for a three-stage training approach focusing on continuous improvement components of teamwork, data collection, and reflection for instructional teams supporting students with more severe disabilities in the general education classroom. Data indicate a consistent pattern of increased teacher–student interaction and decreased paraprofessional–student interaction for the group receiving training. The means and extent of teacher–student interaction varied among teams, but data suggest overall increased teacher communication and connection with target special education students. Selected strategies resulted in decreased paraprofessional proximity to the special education student. In many instances paraprofessionals continued to maintain responsibility when the student was off task or behavioral issues arose; however, unlike actions prior to training, paraprofessionals would intervene and subsequently step away from the target student to engage in additional responsibilities in the classroom. Data and comments suggest that paralleling a decrease in interaction with special education students came an increase in paraprofessional integration into a number of general education classroom activities. However, there is minimal evidence supporting the impact of this shift in adult behavior on the learning of target students. The indirect student-learning outcome of engagement was not found to noticeably change for this group of students. Also, academic engagement was narrowly defined according to the observational tool. Observers did not measure the extent to which the student was following precise directions when academically engaged. Similarly, there was not a measure of actual listening and comprehension.

Although the elements that encompass continuous improvement (teamwork, goal selection, data collection, and reflection) are not new in promoting positive change, the context and training approach supporting change in adult behavior was new for these instructional teams. Experimental group training took place midyear after students had been integrated for many months and various routines had been clearly established. Collaboration among educational team members varied depending on a number of factors. Prior knowledge, communication and group interaction skills, logistical issues (e.g., lack of planning, time), attitude, and administrative leadership all played a part in each team's ability and effectiveness in planning for ongoing student support in the general education setting. Likewise, the goal of student integration appeared to vary or was lost among other priority issues in many of these general education classrooms. For this reason, awareness of present and best practices regarding paraprofessional support and teacher interaction served as an important first step in the training session. It afforded participants the opportunity to reflect on integration practices and revisit the ultimate goal of meaningful student integration into the school community. This initial segment served not only as an awareness session, but also as an important foundation in nurturing attitudes necessary for systems change to occur.

An underlying training premise was that there must be a coordinated effort between teacher and paraprofessional to enhance student interdependence. For some, training appeared to grant "permission" to coordinate efforts for the benefit of the special education student and the entire class. Student goals gave teamwork meaning. Goals were either a refinement/extension of original Individual Education Plan (IEP)

goals or an additional goal deemed appropriate in fostering student interdependence. Transforming broad goals into measurable strategies relative to adult actions was an essential next step in achieving results. This was also important as it actualized how to achieve the stated goal as well as what influence adult behaviors have on student behavior. Unlike traditional IEP meetings, many general education teachers took the lead in establishing student goals and strategies, creating teacher ownership in both problem and solution. Observational data collection gave teams a method of gaining snapshots of strategy effectiveness toward their stated goal. Review of submitted observation forms revealed that participants overall tended to be summative in their data collection, indicating a need for further guidance and practice in this area. Team reflection was also introduced and modeled as an essential element in determining strategy adjustment. Reflection was not consistently monitored; however, it is believed that most teams used an informal format, discussing information on collected data whenever time was available. The role that special education staff (e.g., special education teacher, occupational therapist, physical therapist) played in the reflection of data should be explored, as observation forms indicated instances of additional collaboration with members of the educational team.

The final training phase, diffusion, is an important element that is often omitted in professional development. Teachers (and paraprofessionals) have shown dissatisfaction with many in-service programs that tend to lead them through only the first two stages in the change process—dissemination of information and demonstration. In essence, participants are informed of the product of change but do not understand or are not exposed to the process of effecting change. Within *Strategies for Student Success,* a 3-week segment of training provided person-to-person communication between facilitators and teams to translate key concepts into new classroom practices. It was important that facilitators relate to the issues of individual teams in an effort to refine and shape the use of the observation–reflection cycle to their unique needs. Again, interaction between teacher (facilitators) and student (teacher–paraprofessional teams) can be seen as an important element in order for instructional teams to adopt this newly learned practice and ultimately change adult behavior. An additional recommendation for future research of this training model should include a measure of adult skills learned at the conclusion of the three-phase training.

For special education students within these continuous improvement teams, both individual and collective benefits were apparent. One of the most important personal benefits included growth and development of relationships. Although varying as a result of student goal, both adult and peer communication and cooperation were altered as a result of the training. The team highlighting "participation with nondisabled peers" as their student goal used a very effective whole-class collaborative problem-solving process as one strategy. Team members indicated on their written evaluation that student–peer relationships had increased both in the classroom and in additional environments (e.g., recess) as a result of this strategy. Although data on peer interaction were not collected, many students were noted to be in proximity with their general education peers on a more frequent basis. In some instances paraprofessionals facilitated communication between students with and without disabilities, providing the opportunity for peer relationships to develop. Replication of this study should also investigate this important element of student interdependence in general education classrooms.

Teacher interaction encouraged adult–student relationships to develop. For one student, behavioral concerns were noted to become much less frequent with direct teacher interaction. It became clear to this team that the student would "act up" when directed by the paraprofessional. Collectively, student expectations were raised as teachers expanded their repertoire of strategies for working with a diverse population of students. Participant teachers were open-minded and willing to learn additional strategies that in turn enabled a relationship to develop between student and teacher. Although not specifically stated, most training participants demonstrated that constant student–paraprofessional proximity was not necessary. Paraprofessionals were also open-minded and welcomed teacher interest and responsibility taken for *all* students in the classroom. They were in a unique position to share their experiences and knowledge encouraging both peer and teacher interaction. An underlying benefit for many of these students was experiencing a balance of natural and paraprofessional support necessary for an appropriate placement.

There are limitations to this study, and results should be interpreted cautiously for several reasons. First, the sample size was small and did not include students with significant behavioral challenges. These students may be more difficult to support in general education classrooms, and their presence in the sample might have had an impact on the noted variables. A follow-up study using a single-subject research design is recommended, enabling readers to clearly visualize the effect of the training on specific students. Second, the average amount of data collected for students in both pretest and posttest phases was approximately 3 hours. Due to time restrictions, further data collection was not possible. Replication of the study using a comparison group research design with a larger number of participants over a longer period of time would enable readers to discern whether participants maintain levels of interaction and engagement. Third, the research was con-

ducted in natural school settings; therefore, within the current design it was not possible to initially match the two samples exactly. Fourth, there was substantial variation in the types of instructional activities to which students were exposed. The investigator could not determine from the data what effect this difference may have had on levels of interaction and engagement. Also, the observational tool does not address issues related to the quality or value of interaction or engaged behavior. Readers must also consider that many participant students were included in general education for only a portion of their day. Different results may have been obtained with overall greater inclusive student participation.

This preliminary study investigated a strategy that appeared to improve conditions for increased teacher interaction or engagement and reduce the chances of negative outcomes for participant students. As a result, this strategy enhanced the ability of general education teachers and paraprofessionals to function as a team for the betterment of *all* students in the classroom.

The principles of continuous change embedded in a communication/change model provided a framework for on-the-job training for teacher–paraprofessional teams. The process provided learning opportunities for both team members. Positive training outcomes included influencing two elements that require attention in order for long-term systems change to occur: teacher–paraprofessional attitudes and teacher–paraprofessional skills. Ultimately, it is believed that for sustained change in how we educate and support students with disabilities, policies and procedures must be aligned to support conditions for change. Training opportunities such as *Strategies for Student Success* outline a path toward reducing heavy reliance on paraprofessionals in the face of support systems that have not yet recognized the need for structural change. Those providing direct student support *can* and *do* make a difference. That difference can result in either detrimental or beneficial student outcomes that contribute to an individual's quality of education. Awareness and application of a flexible, continuous improvement process can enhance the chance of student success in the general education classroom and promote the foundation for system reform.

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Appendix
Training Implementation

Student goal	Strategy	Teacher actions before strategy implementation	Para actions before strategy Implementation	Teacher actions after strategy implementation	Para actions after strategy implementation
Andrew: Increased interaction with nondisabled peers during center activities	– Collaborative Problem Solving – Visual (computer) – Peer instruction on communication – Alternate reading group supervision	– Facilitated reading group center – Indicated rotation of center activities – Supervised all language arts centers	– Sat next to student—verbally prompted him to complete folder activities – Accompanied student to computer and bookshelf reading center	– Alternated reading group instruction with direct instruction of target student – Modeled/reinforced peer interaction – Circulated and supervised all language arts centers	– Alternated reading group center activities – Rotated assisting student to centers, verbally prompted student to complete activity – Modeled/reinforced peer interaction
Glenn: Increased participation in music activities alongside general education peers	– Acquire Rifton chair – Teacher proximity – Individualized Student planning	– Taught music lesson—minimal attention to student in back corner of classroom	– Sat next to wheelchair – Prompted student participation in music lesson – Removed student from classroom if student became vocal	– Taught music lesson – Direct attention and reinforcement to student sitting in close proximity – Selected songs that student enjoyed as part of opening – Provided song related manipulative	– Removed student from wheelchair to Rifton chair – Sat behind student and peers – Supported teacher if student needed assistance/student became agitated
Ben: Initiate independent work during vocabulary time with redirection from peer buddy	– Peer Buddy – Visual Cue – Social Story on student helper and completion of work	– Initially directed whole class activity – Observed students from desk – Answered peer student questions – Minimal attention to student	– Gave visual and verbal cue for student initiation of work – Minimal support of work completion – Sat next to student or conversed with teacher	– Directed activity – Used visual cue intermittently to redirect student – Acknowledged student and progress of independent work on a consistent basis	– Created/read social story with student – Taught peer use of visual cue – Assisted others and intervened if student was off task
Chelsea: Independent completion of seatwork. Follow teacher directions to begin calendar time (CT)	– Reinforcement system, initiating calendar time – Visual cue – Teacher proximity	– Began independent work time, circulated and supported peer students, minimal interaction with target student – Verbal signal of transition—CT – Facilitated activity	– Gave student independent work – Sat next to student, verbally prompted student completion – Verbal/physical prompting for transtion to CT – Sat next to student	– Initiated session – Provided student encouragement for work completion – Gave student symbol to begin class transition to CT – Acknowledged student during CT	– Gave student work, monitored progress/completion and behavior without sitting next to student – Assisted additional students – Assisted student if signaled by teacher
Luke: Seek appropriate verbal recognition from teacher during daily writing activity	– Social story on talking in class – Visual cue-finished – Reinforcement system, markers	– Gave directions for small group work – Monitored peer student groups – Modeled and physically supported peer students	– Supported student, peers in small group – Prompted student to complete activity, reinforced/corrected student	– Gave directions for small group work – Monitored peer student groups – Intermittent verbal reinforcement and use of marker system with target student	– Read social story with student – Supported student, peers in various groups – Prompted student to use visual cue
Duncan: Increased participation in "seek and find" activity and small group	– Teacher proximity – Specific placement on floor – Prior preparation for small group activity	– Read story, poem – Discussion/question-answer period with students – Monitoring small group activity	– Entered classroom with student, sat next to student during large group – Guided student to small group. Sat next to student during small group activity	– Read story, poem – Discussion/ question answer period with students – Frequent recognition of student in large/small group activity	– Prepared student for activity prior to class – Guided student into location in front of teacher upon entering—sat behind group – Directed and supported student to small group activity