Objective. This study examined the intervention success of weekly collaborative consultation between therapists and teachers.

Method. Ten therapist–teacher pairs consulted for 60 min weekly throughout the school year about students identified as having sensory integration dysfunction with learning problems. Each week, the pairs identified a specific functional classroom goal then designed either a remedial or compensatory intervention and set criteria for intervention success. At each successive weekly meeting, the pairs determined whether the goal was met. Intervention success was analyzed across 10 students (for a total of 213 goals).

Results. There was a positive effect for overall intervention success. Although remedial and compensatory interventions were equally successful across student performance areas, therapist–teacher pairs demonstrated a preference for compensatory and academic goals.

Conclusion. The overall positive effect for intervention success suggests that when occupational therapists and teachers collaborate on behalf of students, they can facilitate student success in a variety of performance areas. Therapist–teacher preference for compensatory and academic goals indicates that therapist–teacher collaboration can be useful for occupational therapists to link interventions to academic goals in school contexts.

The least restrictive environment (LRE) principle of the Education for All Handicapped Children Act of 1975 (Public Law 94-142; amended by the Individuals With Disabilities Education Act of 1990 [Public Law 101-476]) mandated that schools include students with disabilities with their peers as much as possible and discouraged removal of any student from the classroom unless it was necessary for the student to benefit from special education. As application of the LRE mandate continues to evolve, research addressing educationally relevant interventions in natural contexts (i.e., the environment in which the activity is typically performed) is becoming increasingly important.

Many authors concur that collaborative team strategies are the commonality among successful applications of the LRE mandate (Benson, 1993; Morsink & Lenk, 1992; Schattman & Benay, 1992; Thousand & Villa, 1990; York, Giangreco, Vandercook, & Macdonald, 1992). Collaborative consultation takes place when persons with diverse expertise, perspectives, and experiences work together as equal partners to design a combined approach to intervention (Dunn, 1991; Johnson & Johnson, 1989; Nevin, Villa, & Thousand, 1992; Pryzwanski, 1974).
Preliminary evidence in occupational therapy applications of collaborative consultation suggests that consultation is useful (Davies & Gavin, 1994; Dunn, 1990; Giangreco, 1986; Palisano, 1989); however, researchers have not investigated factors, such as intervention approaches, that may influence consultation success. Consequently, the empirical base for making good decisions regarding consultation is limited (West & Idol, 1987). Because school-based therapists most commonly select remedial and compensatory interventions (Dunn & Campbell, 1991), these collaboratively designed interventions were compared in the current study.

Literature Review

Three service delivery models (direct, monitoring, consultation) have been identified as viable in the public school setting (American Occupational Therapy Association [AOTA], 1989; Dunn, 1988). In contrast to direct service delivery, both consultation and monitoring can be described as integrated service approaches. Integrated approaches suggest that services are provided in the contexts where the skill or activity is performed (Rainforth, York, & Macdonald, 1992). Each service delivery model is valuable when applied with careful consideration of an individual student’s needs. However, consultation is the least familiar model to occupational therapists (Dunn, 1988) and perhaps a useful mechanism to implement the IRE mandate.

Occupational therapy research has begun to address the efficacy of consultation (Davies & Gavin, 1994; Dunn, 1990; Giangreco, 1986; Palisano, 1989). Davies and Gavin (1994) and Palisano (1989) compared direct individual or group services with a combination of direct group and consultation services in public school settings and found that both service delivery models were effective. In these studies, however, standardized tests (i.e., status measures) were used to measure progress, which may have limited the relationship to educational outcomes (Cook, 1991; Dunn, 1990; Dunn & Campbell, 1991; Sattler, 1974).

Dunn (1990) and Giangreco (1986) addressed the efficacy of consultation in pilot studies by comparing direct and indirect services. In his single-case study, Giangreco found significantly improved student microswitch use through a combination of training, consultation, and monitoring when compared with direct services. Dunn found that both direct service and collaborative consultation were equally viable service deliveries because the 14 children studied attained the same number of individualized education program (IEP) goals in the two conditions.

The benefits of consultation can include not only student success, but also behavior and attitude changes in the consultee (Davies & Gavin, 1994; Dunn, 1990; Giangreco, 1986; Palisano, 1989). Collaboration among therapists, teachers, and parents is likely to facilitate generalization of functional skills in IREs (Case-Smith, 1995) and may lead to a more positive view of the learning environment and the contribution of occupational therapy to that environment (Dunn, 1990).

In addition to considering service delivery models, occupational therapists must consider which intervention approach is appropriate. The two most common intervention approaches in the educational setting are remedial and compensatory (Dunn & Campbell, 1991). The purpose of the remedial intervention approach is to improve functional abilities in the areas of dysfunction (Dunn & Campbell, 1991; Dunn, Campbell, Oetter, Hall, & Berger, 1989). In contrast, compensation minimizes the effect of the disabling condition to allow a student to participate in life experiences that otherwise may not be possible (Dunn & Campbell, 1991). Although both remedial and compensatory interventions are used in the educational setting, researchers have yet to compare these approaches.

Although empirical evidence supports the efficacy of consultation in school settings (Davies & Gavin, 1994; Dunn, 1990; Giangreco, 1986; Palisano, 1989), further research needs to identify specific strategies and intervention approaches for effective consultation. The present study explored the success of collaborative intervention success and therapist-teacher consultation choices in the educational setting.

Method

Subjects

As part of a larger study that addressed the application of sensory integrative principles within the classroom, this study used the original convenience sample of 4 occupational therapists, 9 teachers, and 10 students from eight different public schools in Montana, Massachusetts, and Pennsylvania. The therapists had at least 5 years of experience working in a public school or preschool program, completed a sensory integration course, and had a minimum of 2 years experience providing sensory-integration-based intervention (see Table 1). The therapists listed all students on their caseloads who met the eligibility requirements, and the second author randomized the student list. The therapists then discussed the study with each student’s parents, moving down the randomized student list until three families agreed to participate with each therapist.

The students included 7 boys and 3 girls between
Table 1
Therapist Demographics

<table>
<thead>
<tr>
<th>Therapist</th>
<th>Level of Education</th>
<th>SIPT Certified</th>
<th>Total Years Experience</th>
<th>Years Experience in Schools</th>
<th>CaseLoad</th>
<th>FT or PT</th>
<th>Community Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Advanced master's</td>
<td>No</td>
<td>9</td>
<td>9</td>
<td>45</td>
<td>FT</td>
<td>Suburban</td>
</tr>
<tr>
<td>2</td>
<td>Entry master's</td>
<td>Yes</td>
<td>12</td>
<td>10</td>
<td>19</td>
<td>FT</td>
<td>Rural</td>
</tr>
<tr>
<td>3</td>
<td>Bachelor's</td>
<td>Yes</td>
<td>(21 graduate hours)</td>
<td>8.5</td>
<td>45</td>
<td>FT</td>
<td>Suburban</td>
</tr>
<tr>
<td>4</td>
<td>Bachelor's</td>
<td>No</td>
<td>22+</td>
<td>13</td>
<td>33</td>
<td>PT</td>
<td>Suburban</td>
</tr>
</tbody>
</table>

Note. FT = full time, PT = part time, SIPT = Sensory Integration and Praxis Tests

Table 2
Student Demographics

<table>
<thead>
<tr>
<th>Student</th>
<th>Age</th>
<th>Gender</th>
<th>Grade</th>
<th>Educational Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6 years 4 months</td>
<td>Boy</td>
<td>Lifeskills</td>
<td>Developmental delay</td>
</tr>
<tr>
<td>2</td>
<td>6 years 5 months</td>
<td>Girl</td>
<td></td>
<td>Learning disability</td>
</tr>
<tr>
<td>3</td>
<td>9 years 6 months</td>
<td>Boy</td>
<td></td>
<td>Learning disability</td>
</tr>
<tr>
<td>4</td>
<td>9 years 0 months</td>
<td>Boy</td>
<td></td>
<td>Learning disability</td>
</tr>
<tr>
<td>5</td>
<td>6 years 5 months</td>
<td>Boy</td>
<td></td>
<td>Other health impaired</td>
</tr>
<tr>
<td>6</td>
<td>9 years 7 months</td>
<td>Girl</td>
<td></td>
<td>Learning disability, other health impaired</td>
</tr>
<tr>
<td>7</td>
<td>8 years 1 months</td>
<td>Girl</td>
<td></td>
<td>Mild mental retardation</td>
</tr>
<tr>
<td>8</td>
<td>6 years 10 months</td>
<td>Boy</td>
<td>ECED</td>
<td>Mild mental retardation</td>
</tr>
<tr>
<td>9</td>
<td>5 years 11 months</td>
<td>Boy</td>
<td>ECED</td>
<td>Mild intellectual deficits</td>
</tr>
<tr>
<td>10</td>
<td>5 years 7 months</td>
<td>Boy</td>
<td>KG</td>
<td>Delayed motor skills, behavior issues</td>
</tr>
</tbody>
</table>

Note: ECED = early childhood education; KG = kindergarten
Table 3
Teacher and Classroom Demographics

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Level of Education</th>
<th>Teacher Certification</th>
<th>Years of Experience</th>
<th>Current Grade</th>
<th>Current Level</th>
<th>Type of Classroom</th>
<th>Number of Students</th>
<th>Instructional Assistants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MS</td>
<td>Elementary education, special education, BD, LD, MR, multiple disabilities, physical disabilities</td>
<td>10</td>
<td>7</td>
<td>KG–1/SCM</td>
<td>6</td>
<td>PT-1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>BS</td>
<td>Elementary education, special education, Medical Specialty in Nursing</td>
<td>30</td>
<td>4</td>
<td>1/REC</td>
<td>30</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>BS</td>
<td>Elementary education</td>
<td>11</td>
<td>3</td>
<td>4/REC</td>
<td>25</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BS</td>
<td>Elementary education</td>
<td>13</td>
<td>5</td>
<td>3/REC</td>
<td>23</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>BS</td>
<td>Elementary education</td>
<td>3</td>
<td>3</td>
<td>Primary/REC</td>
<td>12</td>
<td>PT-1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>BS</td>
<td>Elementary education</td>
<td>16</td>
<td>15</td>
<td>4/REC</td>
<td>21</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>MS</td>
<td>Elementary education, special education, BD, MR, special education, special education</td>
<td>21</td>
<td>11</td>
<td>KG–2/SCM</td>
<td>9</td>
<td>FT-1</td>
<td></td>
</tr>
<tr>
<td>8 &amp; 9</td>
<td>MS</td>
<td>Elementary education, special education, special education, special education, special education, special education, special education, special education</td>
<td>15</td>
<td>4</td>
<td>ECED/SCM</td>
<td>8</td>
<td>FT-2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>MS</td>
<td>Elementary education, special education</td>
<td>19</td>
<td>8</td>
<td>KG/REC</td>
<td>15</td>
<td>FT-1</td>
<td></td>
</tr>
</tbody>
</table>

Note. BD = behavior disorders, BS = bachelor's of science, ECED = early childhood education, FT = full time, KG = kindergarten, LD = learning disabilities, MR = mental retardation, MS = master's of science, PT = part time, REC = regular education classroom, SCM = self-contained, mainstream

'Number corresponds to student number.

Collaborative consultation process could include therapist observation of the student in the school environment; however, the teacher directly carried out the interventions in the day-to-day context of the natural educational environment. Before the next planning meeting, the teacher evaluated the intervention success by measuring the student's performance in relation to the criterion that the pair had established. During the next weekly meeting, the therapist marked yes, the criterion was met, or no, the criterion was not met, on the IDF. When the therapist–teacher pair did not document whether the goal criteria had been met, the first author identified whether the goal was met, unmet, or questionable according to the criteria shown in Figure 1.

At each successive weekly meeting, the pairs documented the specific performance problem, the performance areas addressed, the functional goal, the criterion for successful performance, the sensory sensitivities addressed, and the intervention approach selected on the IDF (see Tables 4–6). A team of two expert pediatric occupational therapists decided on the appropriate performance areas or interventions for 7 unclearly marked performance areas and 14 unclearly marked interventions.

Results
Characteristics of the Data Set

The data set included 213 interventions designed during weekly therapist–teacher collaborative consultation sessions throughout the school year for 10 students. Overall intervention success was 63% (n = 134). Pairs 1 through 9 collaborated weekly from September through the end of the school year (April–June) for an average of 21 hours (on behalf of the students in this study). Pair 10 did not begin weekly collaborative consultation until February, resulting in 13 hours of consultation; therefore, these data were excluded from analysis.

![Figure 1. Criteria for designating unmarked goals met, unmet, or questionable.](http://ajot.aota.org/)

Downloaded From: http://ajot.aota.org/ on 10/14/2018 Terms of Use: http://AOTA.org/terms
Table 4
<table>
<thead>
<tr>
<th>Remedial Intervention Examples</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overwhelmed and confused by daily schedule</td>
<td>Provide with flip picture schedule with one-step photos of each activity in homeroom.</td>
</tr>
<tr>
<td>Difficulty retrieving objects from desk</td>
<td>Set up kinesthetic &quot;feely box&quot; in classroom containing 10 common classroom objects to be identified.</td>
</tr>
<tr>
<td>Math work very disorganized</td>
<td>Provide worksheets with premade headings and reduced number of problems (two per line).</td>
</tr>
<tr>
<td>Difficulty aligning letters on line</td>
<td>Provide laminated letter practice sheet with three colors (prepared by the teacher). Put stickers on letters oriented correctly.</td>
</tr>
<tr>
<td>Uses too much pencil pressure when writing</td>
<td>Provide opportunities to practice spelling words with watermark and brush, using relaxed, easy pressure.</td>
</tr>
</tbody>
</table>

Characteristics of the Goals

The therapist–teacher pairs selected compensatory interventions (n = 126, 59%) more frequently than remedial interventions (n = 76, 36%) during collaborative consultation (see Figure 2). They chose academic performance areas most frequently (n = 133, 62%), with ADL interventions a distant second (n = 22, 10%). When combining the intervention approach and the performance area, the pairs demonstrated a preference for compensatory and academic goals (n = 89, 42%).

Therapist–teacher pairs identified 18 (8%) goals as combined performance areas. The pairs most frequently selected academic and socialization performance areas (n = 5, 28%) followed by combined performance areas that included socialization (n = 13, 72%) and academics (n = 13, 72%) (see Figure 3). However, of the total single performance areas selected (n = 195), the pairs identified only 8 (4%) within the socialization performance area alone.

Comparison of Intervention Success Across Performance Areas

We conducted a series of analyses of variance (ANOVA) to address the question: Is there a difference in the success rates of weekly remedial and compensatory interventions? Each analysis considered the dependent variable (success rate) measured across independent variables (intervention, performance area, teacher, therapist). We tested main effects and interactions among independent variables. Only the independent variable of therapists was significant, F = 3.68, p = .013.

We selected a post hoc Scheffé multiple comparison to examine differences in student–teacher success across therapists. A therapist group consisted of data for each student who received intervention from that particular therapist throughout the school year. Significant differences existed between Therapist Group 1, with a mean success rate of .75, and Therapist Group 2 (M = .42). Significant differences also existed between Therapist Group 3 (M = .78) and Therapist Group 2 (M = .42).

Significant differences existed within Therapist Group 1 between Student–Teacher Pairs 1 and 3, and Student–Teacher Pairs 1 and 2, with no significant differences between Student–Teacher Pairs 2 and 3 (see Table...
7). No significant differences existed within Therapist Group 2 or Therapist Group 3. Across therapist groups, Student 2 experienced the most weekly goal success ($M = .91$), and Student 4 experienced the least weekly goal success ($M = .33$).

Discussion

The results of this study indicate that remedial and compensatory interventions were equally successful across performance areas when therapist–teacher collaborative consultation occurred weekly, although the pairs demonstrated a preference for compensatory and academic interventions. Weekly criteria were used to measure intervention success in order to examine the link between occupational therapy collaborative interventions and student outcomes in educational environments. We did not select test scores or developmental milestones because these measures address specific skills in isolated settings; thus, the relevance to educational outcome may be limited (Cook, 1991; Dunn, 1990; Dunn & Campbell, 1991; Sattler, 1974).

When teachers and therapists dedicated 60 min weekly to collaboratively design interventions, students achieved an overall intervention success rate of 63%. This success rate may have been higher if we had used a longer period of collaboration to show an intervention effect. When Dunn (1990) compared direct and consultation conditions (each 60 min per week) and used annual IEP goals to measure intervention success, students achieved nearly three fourths of their IEP goals in both conditions. Future studies comparing the success of weekly goals and yearly IEP goals measured in school contexts would provide helpful information regarding weekly collaborative contributions to IEP success.
Success Across Therapists

The finding of significant intervention success rate differences between Therapist 2 and Therapists 1 and 3 was not related to experience (i.e., 8.5–13.0 years) or to intervention frequency. This finding may be explained by a difference in practice setting because Therapist 2 practiced in a rural community that required extensive traveling, and Therapists 1 and 3 practiced in suburban communities. Perhaps travel time, caseload, classroom environment, inclement weather, community resources, and student and teacher factors influenced intervention success. Further research would be helpful to identify the influence of specific therapist, teacher, and student variables on intervention success.

Performance Area Choices

The findings that therapist–teacher collaborative pairs selected interventions from all seven performance areas and that the interventions were equally successful across performance areas suggest that therapists have a wide range of opportunities to apply their skills to support students in LREs. As suggested by Dunn (1990), when therapists become involved with the student’s natural life environments, they may recognize additional opportunities to apply their expertise. Perhaps as occupational therapists support students in a wide variety of LREs (e.g., lunchroom, gym, music, transition times), a link between occupational therapy expertise and student success becomes clear.

Despite choosing a wide range of performance areas across students, the pairs demonstrated a preference for interventions that addressed the academic performance area (62%), even when they chose interventions that combined performance areas (72%). Perhaps the teacher influenced the performance area choices in favor of academics to ensure that the intervention strategies were appropriate to these educational settings, which emphasize academic performance. Other school settings may prefer different performance areas (e.g., work may be the emphasis in a vocational education setting).

Coutinho and Hunter (1988) suggested that an occupational therapist’s orientation is directed to the process of how a student engages in educational activities, whereas the teacher’s orientation is on the outcome of educational activities. Perhaps collaboration facilitates new ways to link the process familiar to occupational therapists with the product familiar to educators to ensure educationally appropriate outcomes in LREs.

Another trend in combined performance area choices was that the pairs frequently addressed socialization (72%; see Figure 3), though they identified a small number (4%) of the total single performance areas as socialization (see Figure 2). Dunn (1990) found that teachers who participated in consultation acknowledged a greater contribution from the occupational therapist in social–emotional development. Because socialization was frequently addressed with other performance areas (e.g., academics, communication, play; see Figure 3) a larger data set of combined performance area choices may contain a strong socialization component.

Remedial and Compensatory Interventions in School Contexts

We hypothesized that compensatory interventions would be more successful than remedial interventions because the compensatory approach emphasizes the use of adaptive strategies to allow a student to successfully participate in daily life experiences (Dunn, 1989; Dunn & Campbell, 1991). However, the findings indicate that both interventions produced equally successful results in school contexts. This finding supports the Ecology of Human Performance principle that remedial (i.e., establish–restore
strategies) and compensatory (i.e., adaptive strategies) approaches can be applied within natural contexts to ensure positive outcomes (Dunn, Brown, & McGuigan, 1994).

Remedial Interventions
Although therapists typically provide remedial interventions in the context of direct service delivery (Dunn & Campbell, 1991), our study suggests that therapists can expand their view of remedial interventions to include their use in collaborative planning in the natural context. It may be argued that remediation of the underlying dysfunction cannot be measured adequately with functional success criteria. Nevertheless, our findings indicate that therapist–teacher pairs can collaborate and design remedial interventions, and teachers can carry out interventions that result in student success in LREs.

Compensatory Interventions
The ANOVA results provide evidence that therapist–teacher pairs may be able to use principles of many frames of reference (e.g., sensory integration, biomechanical, motor learning, neurodevelopmental treatment) to design compensatory (i.e., adaptive) interventions in educational environments. For educators, the student’s ability to perform school tasks is their primary concern (Coutinho & Hunter, 1988), although teachers may not realize the nature of the student’s problem (Ayres, 1979). Perhaps immediate compensatory intervention success helps teachers and students with classroom and learning challenges and, therefore, may increase both teacher and student motivation.

Limitations and Directions for Future Research
Four central limitations are inherent in the design of this study. First, this study compared a small sample of therapists, students, and teachers; thus, the generalizability of the post hoc Scheffé multiple comparison results is limited. However, because 213 goals across 10 students formed the total data set, the generalizability of the comparisons between remedial and compensatory intervention success (ANOVA) are strengthened, as are the trends among therapist–teacher collaborative choices. Nonetheless, future studies of a larger sample of subjects may be helpful.

Second, because each teacher provided collaborative intervention for one or two students, differentiation between student and teacher effects on intervention success was beyond the scope of this study. However, teacher variables (e.g., experience, number of students in classroom, classroom supports) and student variables (e.g., motivation, sensory processing problems, general health) may influence intervention outcomes. Future studies with two or more students in each teacher’s classroom would provide valuable information about student and teacher variables and their relationship to student success.

Third, interrater reliability was not addressed for the therapist–teacher pairs’ intervention and performance area choices. This limits the generalizability of the study because the consistency of therapist–teacher category selections is unclear.

Last, the design of this study prescribed interventions that are different in manner from those typically provided in school settings. Therapists may dedicate 60 min weekly to direct service, but it is uncommon for therapists and teachers to dedicate 60 min per week to collaborative consultation. Future studies addressing collaborative interventions at different frequencies (e.g., biweekly, monthly) and for different lengths of time (e.g., 30 min, 45 min) may provide more information about consultation in a typical setting.

Because we sought to investigate the efficacy of therapist–teacher pairs’ use of collaborative consultation interventions in natural contexts, collaborative consultation was the only service delivery model used with these students. However, when school-based therapists provide interventions on the basis of the student’s needs, they often combine services (e.g., direct and consultative, direct and monitoring) to affect a broad range of activities in the student’s environment (Dunn, 1990; Dunn & Campbell, 1991). Future research addressing service delivery combinations that yield the most positive effects would be helpful.

Conclusion
The positive outcomes of this investigation add to the growing amount of research supporting the efficacy of collaborative consultation (Davies & Gavin, 1994; Dunn, 1990; Giangreco, 1986; Palisano, 1989). Although student success indicated that remedial and compensatory interventions were equally viable strategies, therapist–teacher pairs demonstrated a preference for compensatory interventions. Perhaps this intervention emphasizes adaptation to the environment for immediate success.

Although current research emphasized pediatric service delivery in natural school environments, occupational therapists provide services in a wide variety of environments (e.g., home, clinic, work) with a variety of professionals (e.g., speech–language pathologists, physical therapists, physicians) for persons of all ages. Collaborative consultation may serve as a useful tool to link occupational therapist expertise and individual success in many contexts. Future research with different collabora-
tors (e.g., occupational therapist and parent, occupational therapist and physician) for persons of different ages and with different conditions in a variety of environments may provide helpful information to guide therapists’ selection of collaborative consultation.

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