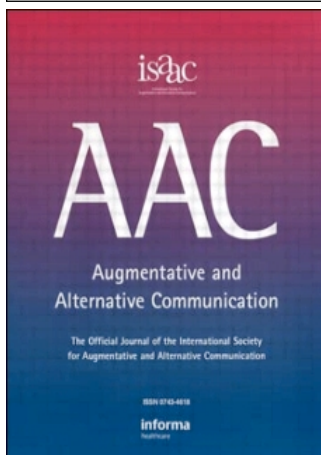


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Publisher: Informa Healthcare  
Informa Ltd Registered in England and Wales Registered Number: 1072954  
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## Augmentative and Alternative Communication

Publication details, including instructions for authors and subscription information:  
<http://www.informaworld.com/smpp/title~content=t713692248>

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Online Publication Date: 01 January 2007

To cite this Article: Light, Janice, McNaughton, David, Krezman, Carole, Williams, Michael, Gulens, Maija, Galskoy, Alix and Umpleby, Marleah (2007) 'The AAC Mentor Project: Web-based instruction in sociorelational skills and collaborative problem solving for adults who use augmentative and alternative communication', *Augmentative and Alternative Communication*, 23:1, 56 - 75

To link to this article: DOI: 10.1080/07434610600924499

URL: <http://dx.doi.org/10.1080/07434610600924499>

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# The AAC Mentor Project: Web-based Instruction in Sociorelational Skills and Collaborative Problem Solving for Adults Who Use Augmentative and Alternative Communication

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In this study, we investigated the effects of a self-paced instructional program, delivered via an accessible website, to teach sociorelational skills and collaborative problem-solving skills to adults with cerebral palsy who used augmentative and alternative communication (AAC). The instruction was designed to prepare participants to serve as mentors, in an Internet-based mentor program, for adolescents and young adults who also used AAC (Light & McNaughton, 2002). The effect of the training program was evaluated in two separate studies utilizing single-subject multiple probe designs: Study 1 investigated the effects of Lesson 1 of the web-based instructional program on the acquisition of sociorelational skills by six adults who used AAC; and, Study 2 focused on the effects of Lesson 2 on the acquisition of collaborative problem-solving skills by 15 adults who used AAC. All participants in Study 1 successfully acquired the target sociorelational skills to help them establish positive mentoring relationships with their protégés, and all participants in Study 2 acquired the collaborative problem-solving skills to support protégés in overcoming challenges in their lives and attaining goals. Results are discussed, along with implications for practice and directions for future research.

**Keywords:** Augmentative and alternative communication; Internet; Instruction; Intervention; Adult; Mentor; Problem solving; Sociorelational; Strategy

## INTRODUCTION

Adolescents and young adults who require augmentative and alternative communication (AAC) confront significant barriers in their drive to maximize educational and vocational outcomes, become full participants in society, attain self-determination, and realize a high quality of life (e.g., Estrella, 1996; Kent-Walsh & Light, 2003; Lowe & Hollman, 1994; Lund & Light, 2001; McNaughton, Light, & Arnold, 2002). These barriers cut across all domains of living: educational, vocational, and social.

Mentoring relationships have been used successfully in other fields (e.g., business, education) to ease transitions and to support protégés in

achieving their personal, educational, and vocational goals (e.g., Galvez-Hjornevik, 1986; Gaskill, 1993; Pannbacker & Middleton, 1994). A mentor is an older, more experienced person who teaches, sponsors, encourages, counsels, and befriends (Goldstein, 1993). Josefowitz (1980) described a mentor as one who provides "... a brain to pick, a shoulder to cry on, and sometimes, a kick in the pants" (p. 99). Adults who use AAC, who have successfully overcome barriers and achieved their educational, vocational, social, and personal goals, offer a rich, potential source of effective problem-solving strategies and encouragement for others with similar disabilities who confront comparable challenges. These adults have much to teach about what outcomes are maximally possible and about how these

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outcomes can be achieved (Kraat, 1985; Light, 1988). As Bowe, Fay, and Finch (1980) argued, "Disabled individuals with several years of disability experience are frequently better aware of the needs of disabled people...than able-bodied professionals in the rehabilitation delivery system" (p. 285).

Unfortunately, most adolescents and young adults who use AAC do not have regular access to adults with similar experiences who can serve as appropriate role models and mentors. Access to potential mentors is limited by geographic isolation, economic limitations, architectural barriers, transportation difficulties, and communication barriers (Williams, 1996). Fortunately, the barriers to mentoring are not insurmountable. The Internet offers tremendous promise as a mechanism to overcome these barriers. For individuals who use AAC, the Internet offers the opportunity "...to move from a situation of being a single isolated user sitting alone...to a person with unlimited ability to interact with others" (Marlett, 1988; p. 261).

Despite the significant potential benefits of mentoring, to date there has been only one published study of mentor-protégé relationships, a pilot research project conducted by Cohen and Light (2000) that paired four adolescents and young adults who used AAC with mentors who also used AAC and followed their interactions over a 4–6-month period. The protégés used e-mail to develop supportive relationships with mentors who used AAC and to discuss a wide range of topics, including education, employment, independent living, personal care attendants, assistive technology, family issues, communication difficulties, finances, and disability-related resources. The protégés in the pilot study were positive about their experiences with their mentors; the mean rating of consumer satisfaction was 3.25 on a five-point scale, from 1 (*poor*) to 5 (*excellent*).

While results of this preliminary research were promising, the mentors involved did not receive specific training prior to the mentoring program; both mentors and protégés indicated that such training would have been beneficial. Not all adults are well prepared to be effective mentors; becoming an effective mentor requires the development of a key set of skills to successfully support a protégé through life transitions. Results of the pilot study by Cohen and Light (2000) suggested the importance of training mentors in the following types of skills: (a) the sociorelational skills required to build positive interpersonal relationships with their protégés; and (b) the collaborative problem-solving skills required to support their protégés in overcoming challenges and meeting goals.

## RESEARCH QUESTIONS

Given the significant potential benefits of mentor programs for individuals who use AAC, the critical need for training for potential mentors who use AAC, and the lack of research in this area to date, this paper reports on a research project that was designed to develop, implement, and systematically evaluate the effectiveness of a web-based leadership training program intended to teach effective mentoring skills to adults who use AAC. This project was part of a large research grant, the AAC Mentor Project<sup>1</sup>. Specifically, this paper reports on the results of two studies designed to address the following research questions: (a) What is the effect of Lesson 1 of the web-based training program on participants' acquisition of a sociorelational strategy designed to build positive interpersonal relationships (Study 1)?; and (b) What is the effect of Lesson 2 of the web-based training program on the participants' acquisition of a collaborative problem solving strategy (Study 2)?

## METHOD

### Experimental Design

Each of the two studies employed a single-subject, multiple probe across subjects research design (McReynolds & Kearns, 1983; Tawney & Gast, 1984). The independent variable of interest was the leadership training program delivered via the Internet: Study 1 investigated the effects of Lesson 1 on the acquisition of a sociorelational strategy, while Study 2 investigated the effects of Lesson 2 on the acquisition of a collaborative problem solving strategy. The dependent variables included measures of the participants' use of the targeted sociorelational strategy (Study 1) and the collaborative problem solving strategy (Study 2) in role play situations designed to simulate potential protégé-mentor interactions.

Each study implemented a multiple probe design with the first three participants as follows: Baseline measures of the dependent variable were collected for each mentor prior to participation in the target lesson of the leadership training program. Once stability was obtained for the dependent variable at baseline, then the target lesson was implemented with the mentors individually, while the other participants remained in baseline. Once effects were demonstrated with the first mentor, then the leadership training was implemented with the next mentor and so on until the first three mentors had successfully completed the target lesson in the training program. Experimental control was established by introducing the

training program (the independent variable) sequentially in a staggered manner across the participants (Bloom, Fischer, & Orme, 1995). Threats to validity due to history, maturation, or testing effects were reduced by the staggered introduction of the training program.

The intervention was then repeated across additional participants (three additional participants for Study 1 and 12 participants for Study 2). Baseline measures were systematically collected for each of these participants. Once a stable baseline was established, intervention was implemented through the target lesson. The intervention was initiated with each participant at a different point in time as soon as baseline data for that participant were stable, but the intervention was not systematically staggered across these remaining participants in order to minimize the time that participants spent in the baseline condition prior to intervention.

### Participants

Adults who used AAC were recruited as potential mentors through the following mechanisms: (a) announcements in AAC newsletters; (b) announcements on disability-related listservs and electronic bulletin boards (e.g., The Augmentative Communication On-Line Users Group, ACOLUG, a listserv designed for consumers who use AAC and their families); (c) direct contact with individuals identified as potential mentors through the review of newsletter and journal contributions, conference proceedings, and presenter lists at state and national conferences; and (d) direct mailings to rehabilitation professionals from the membership directory of the United States Society for Augmentative and Alternative Communication (USSAAC) requesting nominations of potential mentors.

All participants met the following criteria: (a) had cerebral palsy; (b) had a significant speech impairment such that they could not rely on natural speech to meet all of their communication needs; (c) used AAC; (d) demonstrated competent communication skills in one-to-one interactions and in small groups according to self report as well as the reports of professionals and family; (e) demonstrated functional literacy skills; (f) were over the age of 20; (g) had successfully attained meaningful educational, vocational, social, and personal goals in their lives; and (h) had demonstrated leadership potential as evidenced through nomination by peers, family, and/or rehabilitation professionals. All individuals identified as potential mentors completed a written application to serve as a mentor and were screened to ensure that they met all selection criteria. References

were solicited from each applicant documenting his or her potential as a mentor. Sixteen adults were randomly selected from the final list of candidates to participate in the first phase<sup>2</sup> of the AAC Mentor Project leadership training. Informed consent was obtained from all participants prior to their involvement in the project. Each participant received an honorarium for participation in the 2-year mentor project, including the training program described in this paper and the actual mentoring program.

Table 1 presents demographic information on the 16 participants. They included seven women (44%) and nine men (56%) who ranged in age from 20 to 48 years (mean = 32 years). All had cerebral palsy and had significant speech impairments such that they required AAC. They used multiple means to communicate, including voice output communication aids (100%), natural speech (56%), gestures and manual signs (19%), light tech communication boards or books (e.g., alphabet boards) (19%), and paper and pen (6%). All of the participants had completed high school. The majority had at least some college education (81%), ranging from some college coursework to completion of a graduate degree. Many of the participants were employed (69%).

Some of the participants demonstrated mastery of the target strategies at baseline prior to intervention. Data are only reported for those participants who did not demonstrate mastery of the target strategies at baseline: six participants for Study 1 and 15 for Study 2 (see Table 1 for the participants in each study).

### The AAC Mentor Leadership Training Program

Development of the instructional program involved consideration of three aspects: content, instructional procedures, and implementation on the World Wide Web (WWW).

#### Content

The web-based training program consisted of a total of five sections, completed in sequence: (1) an introduction that welcomed participants, provided an overview of the Penn State AAC Mentor Leadership Training, and described the overall goals of the training program; (2) Lesson 1, which taught a sociorelational strategy; (3) Lesson 2, which taught a collaborative problem solving strategy; (4) Lesson 3, which taught participants how to access disability-related information and resources; and (5) a final lesson that provided a review of the strategies learned<sup>3</sup>. This paper focuses on the effects of Lesson 1 and Lesson 2, which are described in greater detail in

TABLE 1 Demographic information on the adults who used AAC who participated in the mentor leadership training program.

Name	Age, sex	Education	Employment	AAC	Access
Linda* <sup>+</sup>	20, F	High school	None	Speech, laptop, EZ Keys <sup>TM</sup> and Multivoice, standard keyboard with keyguard	Direct selection with finger
Gail <sup>+</sup>	25, F	Some college coursework	Volunteer tutor for 1 <sup>st</sup> graders	Liberator <sup>TM</sup> with Unity—Morse Code	Morse code with left heel switch
Ron <sup>+</sup>	47, M	4 yr. degree (communication)	Branch manager, independent living center	Liberator <sup>TM</sup> , alphabet or word display, standard keyboard	Direct selection with big toe
Rick <sup>+</sup>	32, M	2 yr. degree, computer programming	None	Gestures, sign, Dynavox <sup>TM</sup> , alphabet or word display, standard keyboard	Head/chin stick, trackball with left foot
Jill <sup>+</sup>	32, F	Sophomore in college	Assistive technology trainer at university	Speech, Liberator <sup>TM</sup> using Word Strategy, standard keyboard	Direct selection with finger
Kelly <sup>+</sup>	41, F	High school	None	Speech, Liberator <sup>TM</sup> with MIKE	Headpointer
Phil	34, M	Some college coursework	Maintenance	Speech, Liberator <sup>TM</sup> , alphabet or word display, computer with standard keyboard, paper/pen	Direct selection with finger
Mike <sup>+</sup>	31, M	Two 4 yr. degrees, one graduate degree in special education	Special education teacher	Speech, Words Plus <sup>TM</sup> device	Head/chin stick
Don <sup>+</sup>	29, M	4 yr. degree (comp. science), some graduate coursework	Software engineer	Signs, gestures, Liberator <sup>TM</sup> with MIKE	Optical pointer/light beam
Teresa <sup>+</sup>	22, F	Senior in college	None	Speech, Dynavox <sup>TM</sup> , Intellikeys <sup>TM</sup> with keyguard	Direct selection with finger
John* <sup>+</sup>	48, M	4 yr. degree	Self-employed, operates a printing business	Liberator <sup>TM</sup> with Word Strategy and wireless transmitter, receiver, MIKE	Direct selection with finger
Jeff* <sup>+</sup>	21, M	Some college coursework	Computer programmer, various jobs	Gestures, signs, Liberator <sup>TM</sup> , keyboard with keyguard	Direct selection with finger
Peter <sup>+</sup>	29, M	Some college coursework	Tech support for assistive technology company	Speech, Liberator <sup>TM</sup> with Word Strategy, standard keyboard	Head/chin stick
Sheila* <sup>+</sup>	29, F	High school	Assistant and mentor at sheltered workshop, representative for assistive technology co.	Liberator <sup>TM</sup> , standard keyboard	Direct selection with finger
Gerry* <sup>+</sup>	36, M	4 yr. degree	Policy analyst	Liberator <sup>TM</sup> , speech, standard keyboard	Direct selection with keyboard
Ivy* <sup>+</sup>	38, F	Some college coursework	Self-employed: creates and sells greeting cards and graphics	Speech, Dynavox <sup>TM</sup> , standard keyboard	Head/chin stick

\*Participated in Study 1 targeting sociorelational skills.

<sup>+</sup>Participated in Study 2 targeting a collaborative problem-solving and goal-setting strategy.

the following sections. It is beyond the scope of this paper to discuss in detail the other parts of the mentor training program; readers are referred to Light and McNaughton (2002) for further information.

### ***Learning Sociorelational Skills—The LAF Strategy***

Lesson 1 of the web-based training program served as the independent variable in Study 1. This lesson focused on the acquisition of positive and effective interpersonal communication skills (i.e., sociorelational skills) to prepare the mentors to develop trusting, supportive, and positive relationships with their protégés. The focus of the instruction was teaching mentors to be other-oriented (i.e., to demonstrate respect and interest in their communication partner, in this case the protégé). Research suggests that individuals who are other-oriented are perceived to be more competent communicators and are preferred as communication partners (Light, Binger, Agate, & Ramsay, 1999). With well-developed sociorelational skills, individuals who use AAC are better able to build positive social relationships with others (Light, Arnold, & Clark, 2003). Specifically, Lesson 1 focused on teaching the coordinated use of positive interpersonal communication skills through the LAF strategy. The acronym LAF was used to summarize the sequence of key sociorelational skills targeted: (a) L = Listen to the protégé and communicate respect; (b) A = Ask the protégé questions to find out more about his/her interests and concerns; and, (c) F = Focus on what the protégé is saying. In addition in Lesson 1, the mentors were taught what behaviors would be detrimental to the development of positive relationships with their protégés. The acronym CRY was used to summarize the behaviors to avoid: (a) C = Don't criticize the protégé; (b) R = Don't react hastily; and, (c) Y = Don't yakky yak about yourself.

### ***Learning Collaborative Problem Solving Skills—The DO IT! Strategy***

The second lesson taught the mentors to use a sequence of collaborative problem-solving and goal-setting skills. In this lesson, the mentors were instructed to ask questions to help the protégés learn to solve problems and set goals themselves; in other words, they were instructed to scaffold the problem-solving and goal-setting process for their protégés, not to simply solve the problem and tell the protégé what to do. The instruction in collaborative problem solving was based on the problem-solving strategy developed by Wehmeyer

and colleagues (Agran & Wehmeyer, 1999; Wehmeyer & Lawrence, 1995) and on work on supporting cognitive strategies by Ylvisaker and Feeney (1996). Specifically, the instruction targeted a five-step strategy, summarized by the acronym, DO IT! Each of the orthographic symbols in DO IT! stood for a step in the strategy. At each step, the mentors were taught to ask questions to prompt their protégés to complete that step in the problem-solving and goal-setting process: (a) D = *Describe* the specific problem or goal and explain why this is a problem or a goal; (b) O = *Outline* lots of different ways to solve the problem or meet the goal; (c) I = *Identify* the consequences of each plan and choose the best plan; (d) T = *Take* action toward solving the problem or meeting the goal; and, (e) ! = *Celebrate* success! when the problem is solved or the goal is achieved. Lesson 2 was the independent variable in Study 2.

### **Instructional Methods**

The instructional methods used in the AAC mentor leadership training program were adapted from the methods for effective strategy instruction developed by the University of Kansas Institute for Research in Learning Disabilities (e.g., Ellis, Deshler, Lenz, Schumaker, & Clark, 1991; Schumaker & Deshler, 1992). Strategy instruction involves instruction in the coordinated use of a series of skills or procedures (Kameenui & Simmons, 1990), in this case, the coordinated use of a series of sociorelational skills to build positive relationships (the LAF strategy taught in Lesson 1), and the coordinated application of a series of collaborative problem solving procedures (the DO IT! strategy taught in Lesson 2).

Each of the lessons in the web-based instructional program followed the same instructional format: (a) Define the goal of the lesson (e.g., learning the LAF strategy in Lesson 1, learning the DO IT! strategy in Lesson 2); (b) Demonstrate the benefits of the target strategy by showing the effects when the strategy is used and the effects when it is not used; (c) Describe each step in the target strategy (e.g., the L, A, and F steps in the LAF strategy); (d) Model strategy use with an example; (e) Check that the mentor knows the steps of the strategy (i.e., ask the mentor to write the steps of the strategy); (f) Check that the mentor recognizes appropriate use of the strategy in various examples through multiple choice questions; (g) Provide repeated opportunities for the mentor to practice using the strategy in role play situations; and (h) Provide feedback on the mentor's performance in response to each role play.

In each web-based lesson, mentors participated in a variety of role-play activities designed to simulate potential real life protégé-mentor interactions. The themes for the role plays were drawn from the autobiographical writings of individuals who used AAC and from previous research by Cohen and Light (2000); names and specifics were modified to protect confidentiality. The role plays required the mentors to respond in writing to messages that might be sent via email by a protégé. After completing each role play, the mentors were sent an e-mail with feedback on their answers and were given additional opportunities to practice the target strategy as required. Specifically, the feedback highlighted which steps of the target strategy the participants had used correctly, and provided corrective feedback (i.e., modeled appropriate strategy use) when strategy steps were omitted or implemented incorrectly.

### Implementation on an Accessible WWW Site

The instruction was conducted via the Internet using a site that was in compliance with the guidelines for WWW accessibility for people with disabilities. (See <http://www.w3.org/WAI/> for further information on WWW accessibility.) The lessons were implemented on the WWW in order to reach, in a cost effective way, a wide range of potential mentors who were dispersed geographically across the United States. The lessons allowed for self-paced instruction. The site provided log-in data to track each participant's completion of the lessons.

### Dependent Measures

The dependent variable in Study 1 was the participants' use of positive sociorelational skills as measured by their accurate use of the requisite components of the LAF strategy. The dependent variable in Study 2 was the participants' accurate use of the collaborative problem solving and goal setting strategy (i.e., the DO IT! strategy). Data on the participants' use of these target strategies were collected during multiple probes at baseline prior to completing each lesson, and post-intervention after the mentor had completed the target lesson on the WWW. Data were collected via e-mails using probes consisting of role play examples, which were based on the typical experiences of adolescents and young adults who used AAC as identified in previous research (i.e., Cohen & Light, 2000) and in the autobiographical writings by individuals who used AAC (e.g., Sienkiewicz-Mercer & Kaplan, 1996; Williams, 1993). (See the Appendix for examples of the probes.)

The mentors' written responses to the probes were analyzed to determine the number of components of the target strategy that were present and correct (see Tables 2 and 3 for the operational definitions and coding for the LAF and DO IT! strategies). Full points were awarded for complete and appropriate use of the target strategy; partial credit was given for partial use of the strategy. Participants completed one role play per probe for the LAF strategy. Each LAF role-play was scored out of a possible eight points. Participants completed two role-plays per probe for the DO IT! strategy. Each DO IT! role-play was scored out of a possible four points; the two role plays totaled eight possible points.

Coders were trained in coding procedures until they met the defined standard with at least 90% accuracy. Periodic checks of the coders' scoring against the standard were made throughout the project to protect against the effect of "observer drift". Point-by-point inter-coder agreement checks were conducted separately for each step in the LAF strategy and the DO IT! strategy for approximately 15% of the data from each

TABLE 2 Operational definition of the LAF strategy for effective interpersonal communication skills.

Skill	Score	Operational definition
Listens	0	Mentor criticizes or judges protégé
	1	Mentor does not demonstrate empathy, but does not criticize protégé
	2	Mentor communicates empathy for protégé
Asks questions	0	Mentor does not ask questions and gives advice
	1	Mentor does not ask questions (OR) asks questions and gives advice at the same time
	2	Mentor asks questions(s) but they are not focused on the key issues
	3	Mentor asks appropriate question(s) to find out more about the situation
Focuses on the issue	0	Mentor talks about other topics or issues without mention of the protégé's subject or problem
	1	Mentor talks about the issue, but also discusses other issues not related to the central issues raised by the protégé
	2	Mentor focuses on one aspect of the issue raised by the protégé (emotions or content)
	3	Mentor addresses all aspects of the issue(s) raised by the protégé (emotion and content)

Note: Maximum score per role play = 8.

TABLE 3 Operational definition of the DOIT! strategy for effective problem-solving skills.

Score	Operational definition
0	Mentor is directive and provides inappropriate advice
1	Mentor does not provide inappropriate advice but does not encourage protégé to use appropriate step of DOIT! strategy (by asking questions) and mentor does not use DOIT himself or herself
2	Mentor uses appropriate steps of DOIT! strategy him- or herself to solve problems, but does not encourage protégé to use appropriate steps of DOIT! strategy
3	Mentor encourages protégé to use appropriate step of DOIT! strategy by asking questions, etc., but also tells protégé the solution to the problem or the goal (advice is not inappropriate; if advice is inappropriate score as "0")
4	Mentor encourages protégé to use appropriate step of DOIT! strategy by asking questions, etc. Mentor does not tell protégé the solution to the problem or the goal; mentor encourages protégé to follow DOIT! steps to solve problem or set goal

Note: Two role-plays were completed in each probe. Maximum score per role-play = 4.

participant. All coders were blind to the condition (i.e., baseline, intervention) of the interactions they were coding in order to minimize bias. Agreement was operationally defined as an exact match between the scores of the codes on the specific step of the LAF strategy or on the DO IT! strategy (e.g., both coders score the L step as a "1"). Inter-coder agreement, defined as the number of agreements divided by number of agreements plus disagreements plus omissions, was 94% for the scoring of the LAF strategy and 94% for the scoring of the DO IT! strategy.

### Data Analysis

Data were summarized in graphic form and were analyzed using systematic visual inspection techniques (cf. Tawney & Gast, 1984) to determine: (a) the trend, level, and slope of data in the baseline and intervention conditions; and (b) changes in the trend, level, and slope of the data across conditions. Data in the intervention condition were compared with the data in the baseline condition to determine the percent of nonoverlapping data (PND) as a measure of the effectiveness of the intervention as proposed by Scruggs and Mastropieri (1998). The PND was calculated by dividing the total number of data points in the intervention phase that did not overlap the data points in the baseline phase by the total number of data points in the intervention phase, and multiplying by 100. According to Scruggs and Mastropieri (1998), PND scores

greater than 90% indicate interventions are very effective; scores of 70–90% indicate interventions are effective; scores between 50 and 70% suggest interventions have questionable effectiveness; and PND scores less than 50% indicate interventions are ineffective.

### Social Validation

The outcomes of the intervention were socially validated to ensure the functionality and value of the web-based instruction to the participants and other stakeholders. Three measures of social validation were used. First, structured interviews were conducted via email with all of the participants immediately following their completion of the training program to determine: (a) if they were satisfied with the mentor training program; (b) if they were better prepared to be a mentor having completed the training; and (c) if they would recommend the training program to others. The participants were also asked what they liked best about the training program.

Second, the participants were again interviewed via email 1 year after completing the training following their year-long involvement serving as mentors of adolescents or young adults who used AAC in the Penn State AAC Mentor Project. The intent of this second measure of social validation was to determine how well the intervention had prepared the participants for their roles as mentors from their perspectives. Specifically, the mentors were asked to indicate whether the mentor leadership training had been a good use of their time and had prepared them to serve as mentors.

Third, the protégés who participated in the mentoring program were also asked to evaluate their satisfaction with their mentors (who had been trained through the web-based program) following their participation in the year-long mentoring program. Specifically, the protégés were asked to respond to questions via email to determine: (a) if they were satisfied with the mentor program; (b) if they were satisfied with their mentor; and (c) if they would continue to email their mentor at the end of the mentor program. They were also asked what they liked best about the mentor program.

### RESULTS

This section presents the results with respect to: (a) the acquisition of positive sociorelational skills (i.e., the LAF strategy) (Study 1); (b) the acquisition of collaborative problem-solving skills (i.e., the DO IT! strategy) (Study 2); (c) the time



required by participants to complete the training program; and (d) the social validation results.

### **Study 1: Acquisition of Positive Sociorelational Skills—The LAF Strategy**

At baseline, prior to instruction, 10 of the 16 participants in the AAC Mentor Program demonstrated at least 80% accuracy implementing the components of the LAF strategy. These 10 individuals still completed Lesson 1, the web-based instruction in the LAF strategy, to solidify their sociorelational skills, but their performance is not reported here since they had already reached criterion prior to their participation in the instruction. All 10 (100%) of these participants continued to demonstrate accurate use of the LAF strategy in the role-plays completed post-instruction, providing evidence that the instruction did not have a negative effect on their performance.

The remaining six participants did not reach criterion (i.e., >80% accuracy) in their use of the LAF strategy at baseline prior to instruction. Figure 1 presents these participants' use of the LAF strategy pre- and post- their completion of Lesson 1 on the WWW. At baseline, these participants ranged in accuracy levels from 38% for Jeff to 71% for Gerry. All of the participants successfully acquired the LAF strategy as a result of the web-based instruction. Four of the 6 participants (i.e., John, Linda, Gerry, and Jeff) demonstrated successful acquisition of the target strategy immediately after completing the web-based lesson; they had a PND of 100%. The remaining two participants (i.e., Sheila and Ivy) successfully acquired the LAF strategy although they required additional practice in role plays and feedback during instruction to do so. These two participants showed some overlap between baseline and intervention conditions: PND of 60% for Sheila and PND of 80% for Ivy.

### **Study 2: Acquisition of Collaborative Problem-Solving Skills—The DO IT! Strategy**

At baseline, prior to intervention, only one of the 16 mentors (Phil) demonstrated use of appropriate collaborative problem solving and goal setting skills. This individual still participated in the web-based instruction in the DO IT! strategy (Lesson 2) to solidify these skills, but his performance is not reported here since he had reached criterion at baseline. This participant continued to demonstrate appropriate use of the DO IT! strategy in the role plays post-instruction; the instruction did not have a negative effect on his performance.

The remaining 15 participants did not reach criterion in their use of the DO IT! strategy prior to instruction. Figure 2 presents these participants' use of the DO IT! strategy pre and post their completion of Lesson 2. All of the participants successfully acquired the DO IT! strategy and used it correctly across a variety of role play situations post instruction. Thirteen of the 15 participants demonstrated 100% non-overlapping data between baseline and intervention; the remaining two participants demonstrated some modest overlap (i.e., 71% PND for Sheila and 75% PND for Teresa).

### **Time Required to Complete the Mentor Training Program**

Data are not available for the time required by participants to complete Lessons 1 and 2 individually; data are only available on the total amount of time required to complete the entire web-based training program, including the introduction, Lessons 1–3, and the final lesson. The majority of the mentors (67%) required fewer than 20 h to complete all of the lessons; 27% of the mentors required 20–29 h; and, only one participant required more than 40 h.

### **Social Validation**

Social validation measures were collected to determine whether the changes observed as a result of the web-based instruction were meaningful ones that were valued by the stakeholders involved.

### ***Mentor Satisfaction Immediately after Completing Training***

Overall, 93% of the respondents reported high levels of satisfaction with the mentor leadership training program; furthermore, 93% reported that they were better prepared to serve as mentors as a result of completing the training. One participant indicated that he did not feel that he benefited personally from the training program since he had already learned all of the target skills in college. Finally, 100% of the participants indicated that they would recommend the mentor leadership training program to others who had not yet learned the target skills. The mentors identified the following strengths of the training program: (a) It was easy to understand, access, and use; (b) The different strategies (e.g., the LAF and DO IT! strategies) were very useful; (c) The role play examples were very useful; (d) The feedback to their role play responses was very helpful; and (d) The program was self-paced and the training was efficient.

### *Mentor Satisfaction with the Training after Serving as a Mentor for 1 Year*

The mentors were interviewed again after they had served as a mentor to an adolescent or young adult who used AAC for a period of 1 year. Results indicated high levels of satisfaction by the mentors: 86% of the participants indicated that the mentor training program had been a good use

of their time and had prepared them well to serve as a mentor to their protégés. Only two participants indicated that the training had not been useful: one indicated that he already knew the skills targeted in the training; and the other indicated that he had not needed to use the strategies during the mentor program because his protégé had not focused on solving problems or setting goals.

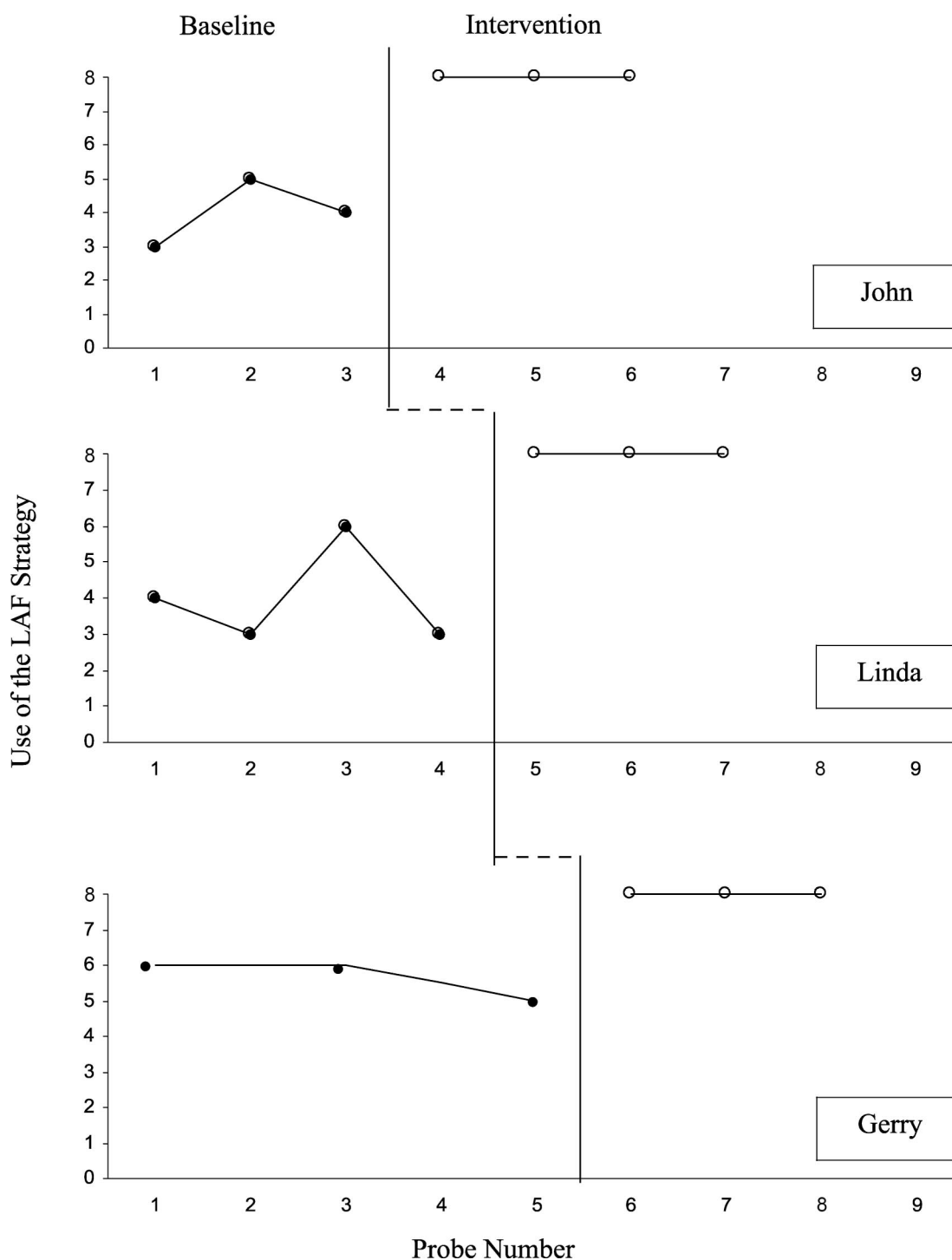


Figure 1. The participants' accurate use of the LAF strategy at baseline and after instruction.

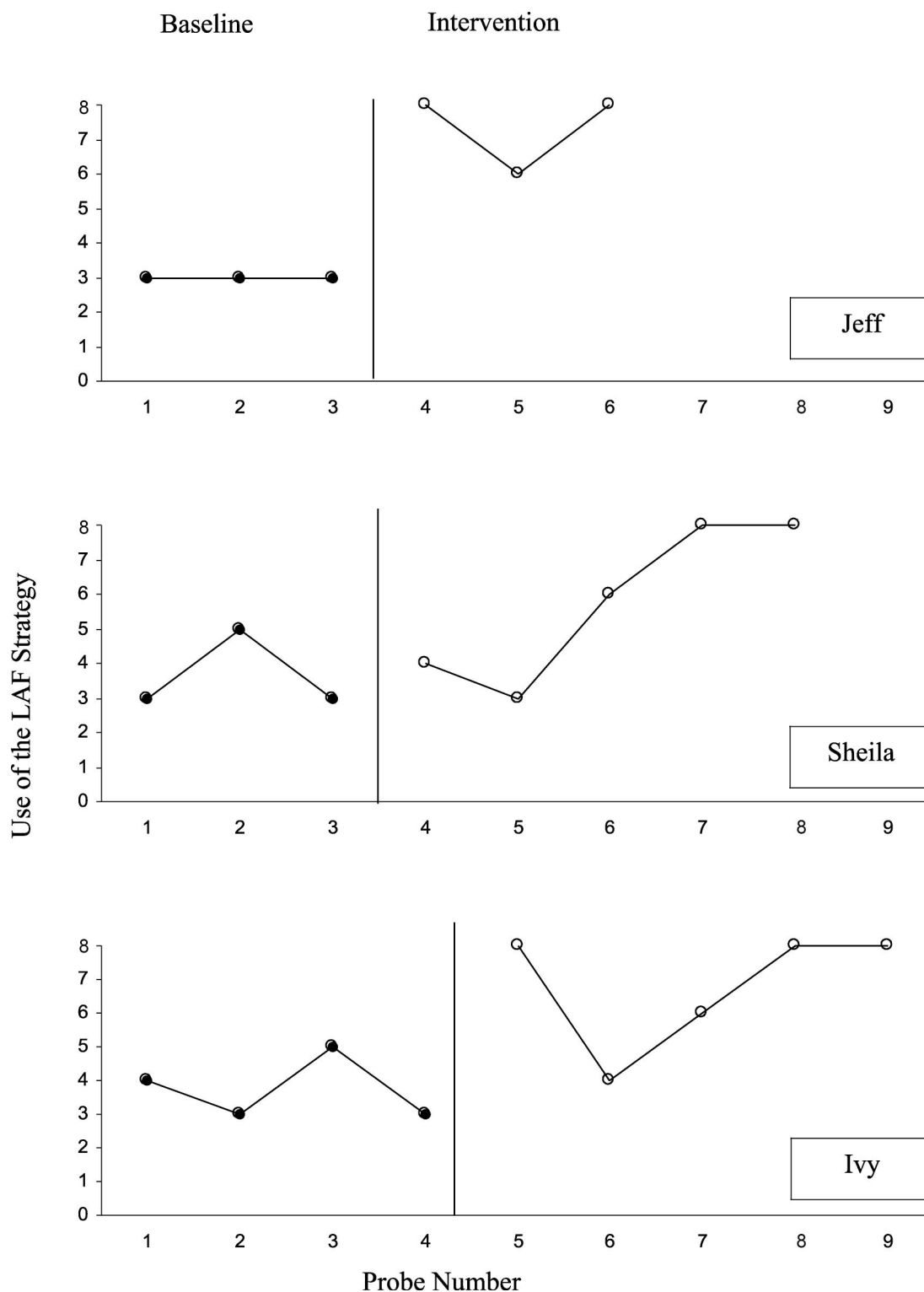


Figure 1. (Continued).

### *Protégés' Satisfaction with the Quality of the Mentors*

Although it was important to evaluate the mentors' satisfaction and perceptions of self-efficacy, it was also important to socially validate the mentor leadership training program by

determining the protégés' satisfaction with their mentors. One hundred percent of the protégés indicated that they were very satisfied with the mentor program and the quality of their mentors. Furthermore, 100% indicated that they would continue to interact with their mentor after the year-long mentor program ended officially.

When asked what they liked best about the mentor program, 73% of the protégés indicated that they liked the social support of interacting with someone else who used AAC, and 45% indicated that they liked having access to someone who could help them solve problems and set goals. These two reasons directly highlight the importance of the strategies targeted through the web-based training program completed by the mentors: The acquisi-

tion of positive sociorelational skills and of collaborative problem-solving skills.

## DISCUSSION

The results of these studies demonstrate that the web-based instruction was effective and efficient. According to the PND classification system

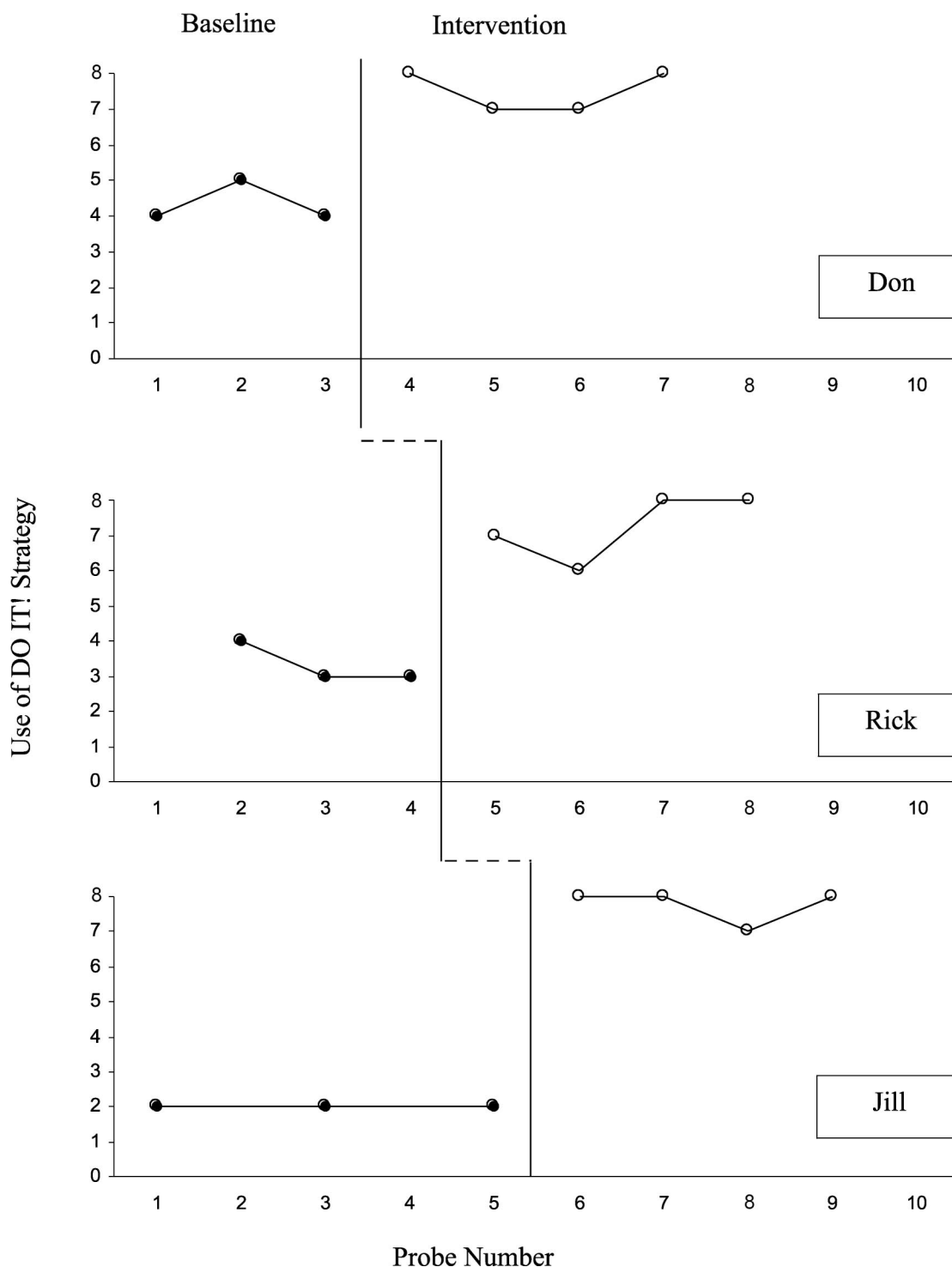


Figure 2. The participants' accurate use of the DO IT! strategy at baseline and after instruction.

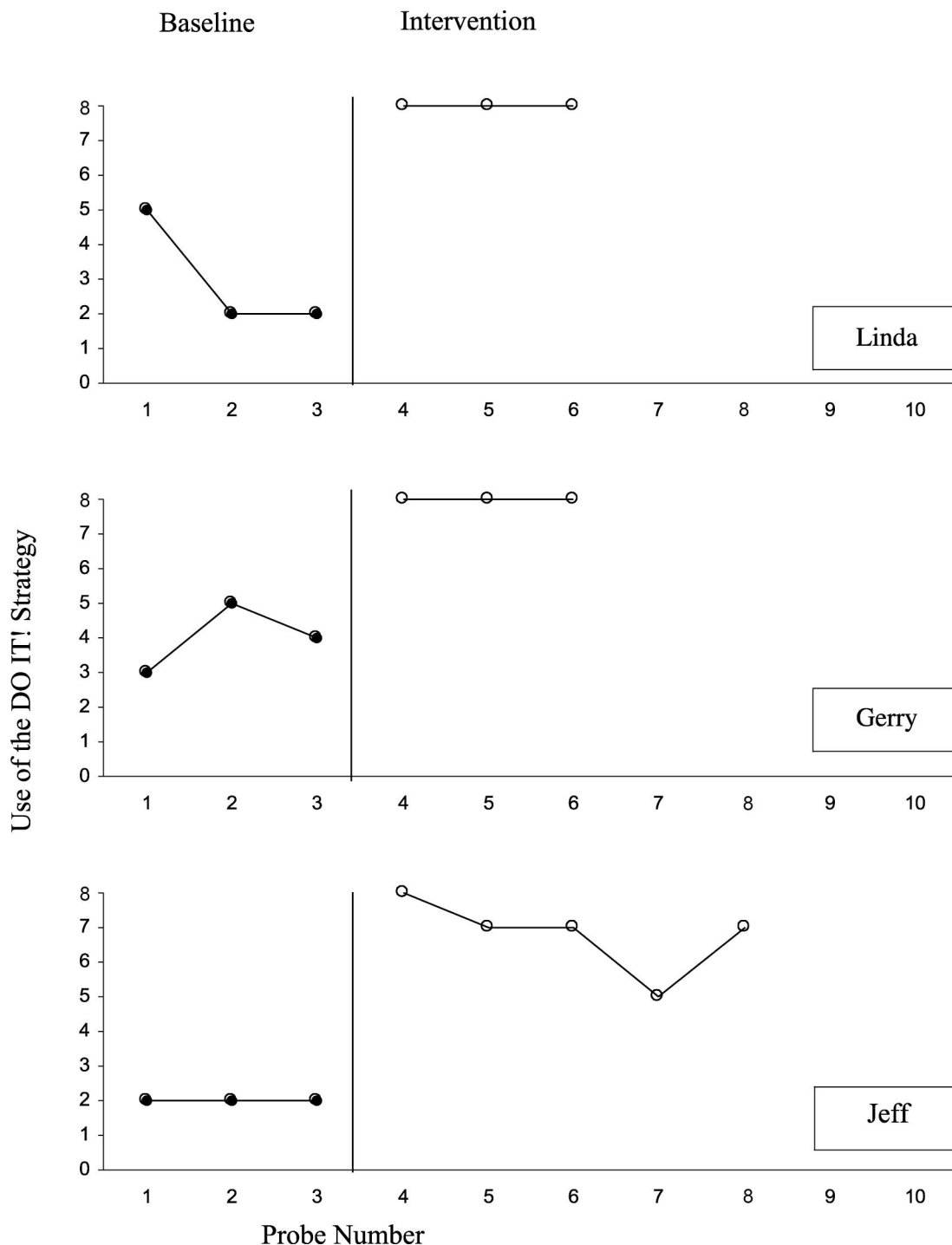


Figure 2. (Continued).

proposed by Scruggs and Mastropieri (1998), the instruction in the LAF strategy was considered effective or very effective for five of the six (83%) participants and the instruction in the DO IT! strategy was considered effective or very effective for all (100%) of the 15 participants. Furthermore, the training program was socially validated by key stakeholders.

The satisfaction of the mentors and protégés in the current study significantly exceeded that reported by Cohen and Light (2000) in their pilot study. As there were a number of differences between the two studies, it is impossible to determine the specific effects of any one variable on consumer satisfaction. However, one key difference was the training received by the

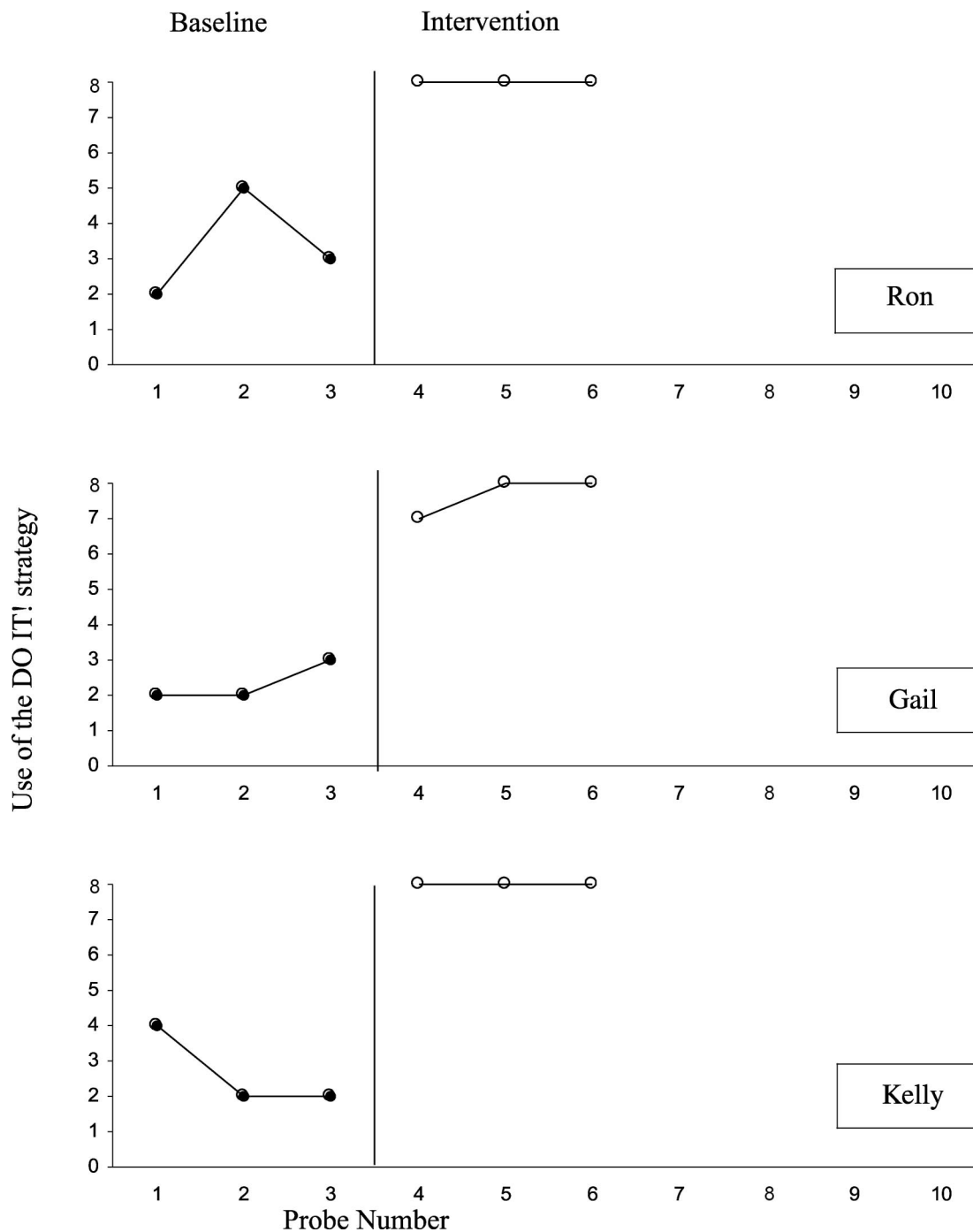


Figure 2. (Continued).

mentors in the current study, which seemed to have a significant positive impact on their effectiveness and the resulting satisfaction of the protégés.

### Effectiveness of the Web-based Training

There are a number of factors that may account for the effectiveness of the web-based instructional program, including those related to (a) the

content; (b) the instructional methods; (c) the instructional contexts (role plays); and (d) the web-based format.

### Content of the Web-based Instruction

The effectiveness of instruction depends, first and foremost, on the relevance of the skills targeted (Light, 1999). McNaughton (2001) argued that learners are most apt to be motivated if they

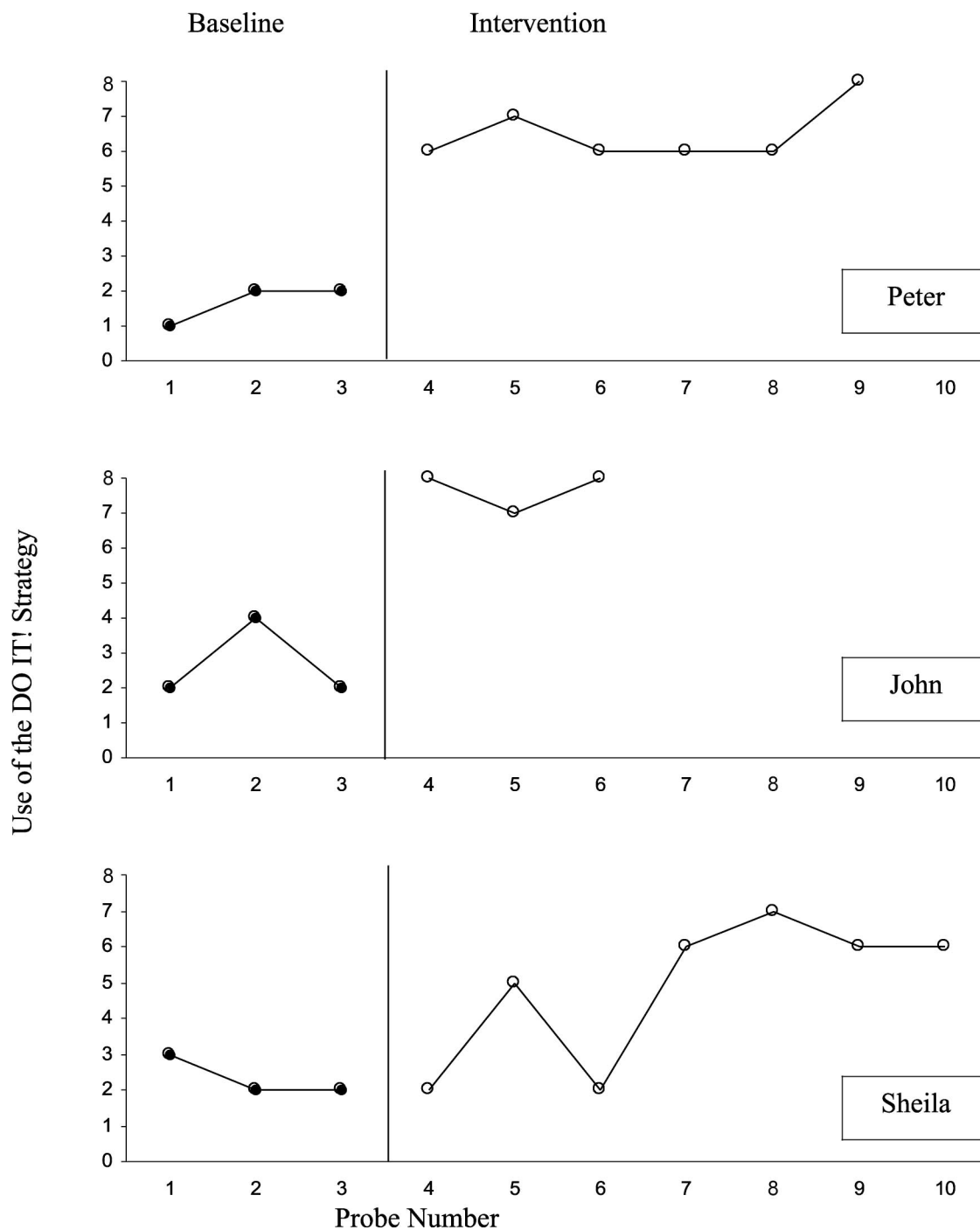


Figure 2. (Continued).

believe that the target skills are worth learning. The web-based instruction implemented in Study 1 and Study 2 targeted skills that were believed, based on available research (e.g., Cohen & Light, 2000; Goldstein, 1993), to contribute to the effectiveness of mentors: positive interpersonal communication skills and collaborative problem solving skills. The relevance of these skills was socially validated, as recommended by Light (1999) and Schlosser (1999), through review by

a panel of key stakeholders that included individuals who used AAC, researchers in AAC, and professionals with significant expertise as mentors.

### ***Instructional Methods***

Besides ensuring that the skills targeted in the web-based instruction were highly relevant to the participants, the program also incorporated

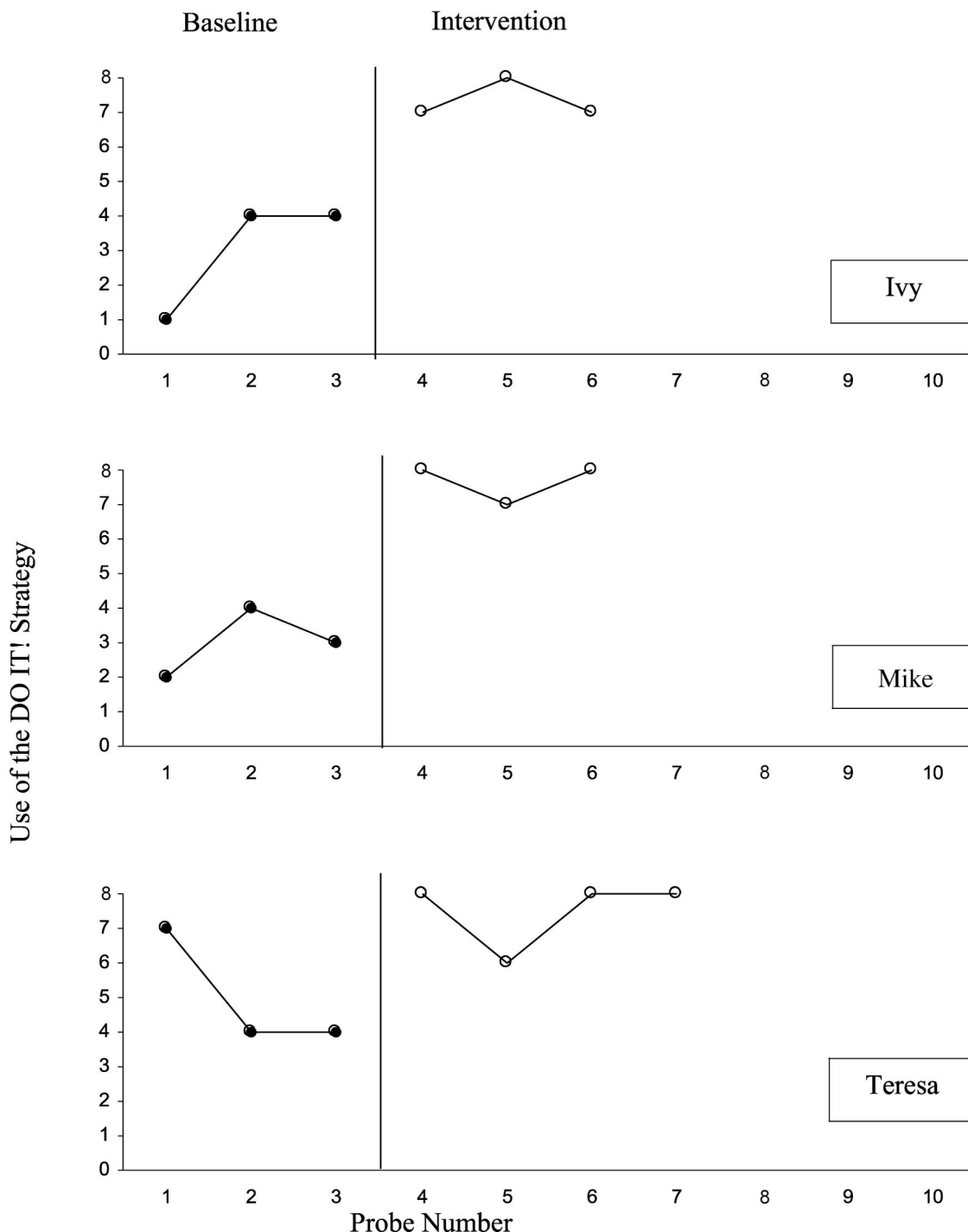


Figure 2. (Continued).

effective evidence-based methods to teach these skills. The instruction provided in each lesson was based on the components of strategy instruction developed by the University of Kansas Institute for Research in Learning Disabilities (e.g., Ellis et al., 1991; Schumaker & Deshler, 1992). The effectiveness of the strategy instruction model has been validated in numerous studies with students who have learning disabilities (see Deshler et al.,

2001). Furthermore, strategy instruction has been adapted successfully to AAC interventions to teach skills to build communicative competence (Light & Binger, 1998) and to teach paraprofessionals interaction strategies to promote the participation of children who use AAC (Kent-Walsh, Light, McNaughton, Hustad, & Miller, 2005). The strategy instruction model incorporates key components of effective instruction; it



provides modeling of target skills for learners, then guided practice in controlled situations to support errorless learning by participants, and finally varied opportunities for independent practice by participants to build mastery (Kameenui & Simmons, 1990; Ellis et al., 1991).

### ***Instructional Context***

The instruction was provided within meaningful contexts that reflected the experiences of individuals who used AAC. Research suggests that learners are more apt to generalize skills when they are learned in contexts that closely resemble situations in the real world in which the skills are required (Cognition and Technology Group at Vanderbilt, 1990; Jonassen, Davidson, Collins, Campbell, & Haag, 1995). The role play examples were drawn from the autobiographical writings of individuals who required AAC to ensure their ecological validity. These examples included a wide range of situations to promote generalization. By practicing strategy use across numerous examples, participants were encouraged to draw analogies across the varied exemplars and to understand the underlying structure and application of the target strategy (Pressley & McCormick, 1995).

### ***Web-based Format***

The implementation of the instruction on the WWW may have also contributed to the positive outcomes of the study. A number of the participants reported that they particularly liked the web-based format because it allowed them to learn at their own pace, according to their own schedule, in their own environment where computer access was maximized. The accessibility of the instruction on the web also meant that participants could independently review information as required.

In summary, the content of the instructional program (i.e., the target strategies), the instructional methods, the instructional context (i.e., the role play examples), and the web-based format were all designed to support successful acquisition of the target strategies by the participants in the two studies.

### ***Efficiency of the Web-based Training***

Not only was the mentor leadership training program found to be effective, but it was also found to be efficient; the overwhelming majority of the participants required fewer than 30 h to complete the five lessons and learn the three strategies. Furthermore, the web-based instruc-

tion was available to the participants in any location where they could access the WWW, thus eliminating the need to travel to a specific location to receive specialized instruction and thereby reducing the time and cost of instruction.

Not only was the web-based instruction efficient for the participants who used AAC, but it was also efficient for the instructor. Once the initial development of the website was complete, only minimal time was required from the instructor to provide individualized feedback to the participants after they completed each role play example. Since this feedback followed the template of the target strategy steps, it was quick and easy for the instructor to complete. Thus, the training was not only efficient for the mentors, but it was also time- and cost-efficient from a service delivery perspective.

### ***Implications for Practice***

Results of the studies reported in this paper suggest that the mentor leadership training program would be a helpful resource for adults who use AAC who are functionally literate and who wish to learn positive sociorelational skills and collaborative problem-solving skills in order to assume a leadership role in the AAC community as a mentor. The training is available to the public at <http://mcn.ed.psu.edu/~mentor/training/intro.html>; it has been modified slightly from the program utilized in the study. Specifically, all interactive data collection and feedback procedures are eliminated from the public website. Since personalized feedback is no longer provided, several self-checks were incorporated into the modified training to support learners in monitoring their own performance. A few revisions were also made to the web-based instruction based on the performance and informal feedback of the participants in the studies. Specifically, it was observed that a few of the participants tended to want to solve problems for their protégés rather than support their protégés in learning to solve problems and set goals themselves. Therefore, Lesson 2 was revised to emphasize the use of a collaborative problem-solving strategy. Mentors were cautioned not to simply tell their protégés what to do, but rather were explicitly told to ask questions to guide their protégés to solve problems and set goals themselves. The actual content of Lesson 2 did not change; instructions were simply stated more explicitly.

With minor adaptations, the program might serve not only to train adults who use AAC as potential mentors, but also to teach adolescents and adults who use AAC (who are functionally literate) sociorelational skills and problem-solving

skills to meet needs in their own lives. For example, the role plays might be revised easily to reflect scenarios in a learner's life rather than hypothetical messages from a potential protégé. (See McCarthy, Light, & McNaughton, in press, for results of research to evaluate an adaptation of the web-based instructional program to teach effective problem solving skills to adolescents and young adults who require AAC.)

Furthermore, the web-based instructional program might be used by educators and rehabilitation professionals as a resource to help them build their own instructional programs to be delivered via face-to-face instruction to individuals who require AAC but who are not functionally literate and therefore cannot access the website independently. Finally, with minor adaptations to the content of the examples and role plays to ensure their relevance, the web-based instruction may be useful to individuals with other types of disabilities who wish to improve their sociorelational skills and collaborative problem solving skills.

### **Additional Applications of Web-based Instruction**

The two studies reported in this paper are some of the first to explore the effects of web-based instruction for individuals who use AAC. Overall the results suggest the potential promise of the Internet as a mechanism to (a) supplement and extend traditional educational and rehabilitation services for individuals who require AAC who are functionally literate, and (b) serve as a viable tool to deliver specialized training to individuals who use AAC who are geographically dispersed. Future research should explore the utility of the Internet as a medium to deliver other types of interventions to individuals who require AAC (e.g., literacy instruction, skills in computer applications, vocational skills, advocacy training, etc.).

### **LIMITATIONS OF THE STUDY**

There are a number of limitations to these studies that should be considered when interpreting the results. First, the studies involved only adults with cerebral palsy who used AAC, were functionally literate, and were nominated as potential mentors. Results of the studies may not be generalizable to other groups of individuals who use AAC.

In order to minimize the time that most participants spent in baseline, the studies were designed as multiple probe designs across the first three participants in each study; the intervention was then repeated across a further three participants in Study 1 and a further 12 participants in Study 2. Experimental control was established

through the multiple probe design for the first three participants in each study; however, the subsequent repetitions of the intervention with the additional participants did not follow a strict multiple baseline design with staggered introduction of the intervention, and therefore experimental control was not unequivocally established for these repetitions. The following approaches were used to minimize the impact of potential confounding variables such as history or maturation: (a) The participants were all adults with cerebral palsy who had reached a stable period of development; (b) Stable baselines were established for every participant prior to introduction of the intervention; (c) The instructional website was password protected to avoid dissemination prior to instruction; (d) Interventions were initiated at different points in time for each participant; and (e) The participants were geographically dispersed across the United States.

Based on the design of the study, it is not possible to determine unequivocally that the participants generalized their use of the target strategies to daily life. They used the LAF strategy and the DO IT! strategy across a wide range of role plays, representing a variety of real-life situations experienced by individuals who require AAC. Informal observations of the participants' interactions with their protégés suggested that the participants also made use of the strategies during the year-long mentoring program. However, data were not systematically collected on strategy use during the actual mentoring program, so generalization cannot be ascertained unequivocally.

Finally, it is important to note the benefits and limitations inherent in conducting investigations such as these studies via the Internet. Use of the Internet allowed the participation of a wide range of individuals who used AAC who were geographically dispersed across the country. It minimized the time and cost of instruction and maximized convenience. However, it did raise some potential challenges with respect to verifying authorship because there was no way to actually observe participants completing the instruction and the probes. Several mechanisms were used to ensure that the participants worked independently. First, they were screened prior to their participation to ensure that they had the necessary literacy skills to complete the online instruction; second, at the start of the study, participants made a commitment to complete the probes and lessons themselves; third, periodic checks were sent to ensure their compliance; and, fourth, all of the responses received from the participants were analyzed for consistency in vocabulary and language structure.

## DIRECTIONS FOR FUTURE RESEARCH

Given the promising results of these studies, future research is urgently required to further investigate effective instruction to teach socio-relational skills and problem-solving skills and to explore the broader applications of online instruction for individuals who require AAC. Specifically, future studies should address the following issues: (a) replication of this study with other groups of individuals who require AAC to establish the generality of the results; (b) investigation of the effectiveness and efficiency of other instructional approaches to build mentoring skills, especially approaches that better meet the needs of individuals who are not literate; (c) comparisons of the relative effectiveness and efficiency of instruction conducted via the Internet compared to other instructional approaches (e.g., traditional face-to-face instruction, use of video simulations); and (d) exploration of the viability of online instruction as a format to teach other skills or strategies to individuals who require AAC (e.g., literacy skills, advocacy skills, etc.).

## CONCLUSION

The web-based intervention described in this paper utilized state-of-the-art technology to reach people with complex communication needs dispersed across a wide geographic area. The intervention was effective and easily accessible, as well as time- and cost-efficient. Through the web-based mentor leadership training program, the participants who used AAC learned how to develop positive interpersonal relationships with others and learned how to support others in solving problems and setting goals. The participants reported that they were better prepared to effectively mentor and empower others with disabilities. They were ready to accept the challenge posed by Michael Williams (1996): "As we master an area of our lives, it is important to go back and find someone else who would like to master the same thing. When you teach someone what you know, there are now two of you blazing the trail rather than you by yourself".

## Acknowledgements

This research was supported by Grant #H133G8004 from the National Institute on Disability and Rehabilitation Research (NIDRR). The opinions expressed here do not necessarily reflect those of the National Institute

on Disability and Rehabilitation Research and no official endorsement should be inferred.

The authors are grateful to the participants in this project who graciously gave of their time and energy to advance knowledge and practice in the field and to support the development of the next generation of individuals who use AAC. The authors also wish to thank Jessica Currall who assisted with the development of the coding systems, and Karen Fallon and Shelley Lund who assisted in the early stages of developing the content for the instructional program.

For further information, visit The Penn State AAC Mentor Project web site at <http://mcn.ed.psu.edu/~mentor/> or contact Janice Light, Ph.D., Department of Communication Sciences and Disorders, Penn State University, 110 Moore Building, University Park, PA 16802; 814-863-2010; [JCL4@psu.edu](mailto:JCL4@psu.edu).

## Notes

- 1 The Penn State AAC Mentor Project was designed to address two objectives: (a) To develop, implement, and systematically evaluate the effectiveness of a leadership training program (delivered via the Internet) designed to teach sociorelational skills and collaborative problem solving skills to adults who use AAC in order to prepare them to serve as mentors; and (2) To develop, implement, and evaluate the effectiveness of a mentoring program linking adolescents and young adults who use AAC via the Internet with mentors who use AAC who were trained under Objective 1. This paper reports the results of the research conducted under Objective 1, the effects of the web-based training program to prepare adults who use AAC as mentors; readers are referred to Light and McNaughton (2002) for a report on the full research grant.
- 2 The Penn State AAC Mentor Project had two phases, each including a mentor leadership training program and a mentoring program for adolescents and young adults who used AAC. The first phase involved a total of 16 mentors. Subsequent to the evaluation of the training program and mentoring program in Phase 1, minor revisions were made to further improve the leadership training and mentoring program and the revised programs were implemented in Phase 2 with a new group of mentors and protégés. This paper reports on the results of the mentor leadership training conducted under Phase 1.
- 3 Readers can access a modified version of the Penn State AAC Mentor Leadership Training Program at the following website: <http://mcn.ed.psu.edu/~mentor/training/intro.html>. This website starts with an introduction (<http://mcn.ed.psu.edu/~mentor/training/intro.html>) and then links four lessons that are designed to be completed sequentially: Lesson 1 (<http://mcn.ed.psu.edu/~mentor/training/comm1.html>) to teach sociorelational skills (i.e., the LAF strategy); Lesson 2 (<http://mcn.ed.psu.edu/~mentor/training/probl1.html>) to teach collaborative problem solving skills (i.e., the DO IT! strategy); Lesson 3 (<http://mcn.ed.psu.edu/~mentor/training/info1.html>) to teach the skills to access disability-related information and resources (i.e., the ASK strategy); and the final lesson (<http://mcn.ed.psu.edu/~mentor/training/alltog1.html>) to review all of the strategies.

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## APPENDIX

### Examples of probes used to evaluate the participants' use of the LAF strategy and the DO IT! strategy

#### *Example of a Probe Used to Evaluate the Participants' Use of the LAF Strategy (Positive Sociorelational Strategy)*

Mary is 16 years old. She lives at home with her mother and her brother and sister. She goes to high school. You are her mentor. She sent you this message.

“Guess what? It’s my birthday today. They had a cake and stuff for me at school. It was really cool”.

What would you write back to Mary?

Write your answer here:

#### *Example of a Probe Used to Evaluate the Participants' Use of the DO IT! Strategy (Collaborative Problem Solving and Goal Setting Strategy)*

Carl is 19 years old. He is attending high school. You are his mentor. He sent this message to you.

“They hired a new aide for me at school and I can’t stand her. She is driving me crazy”.

What would you write back to Carl?

Write your answer here: