Teaching Partner-Focused Questions to Individuals Who Use Augmentative and Alternative Communication to Enhance Their Communicative Competence

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A single-subject, multiple-probe experimental design was used to investigate the effect of instruction on the acquisition, generalization, and long-term maintenance of partner-focused questions (i.e., questions about communication partners and their experiences) by individuals who use augmentative and alternative communication (AAC). Six participants who had severe speech impairments and used AAC participated in the study; they ranged in age from 10 to 44 years, had a variety of disabilities, and used a range of AAC systems. Instruction used a least-to-most prompting hierarchy in real-world interactions and during simulations. All of the participants successfully learned to ask partner-focused questions spontaneously in social interactions; they required an average of approximately 6 hours of instruction (range: 3–11 hours). The participants generalized the use of partner-focused questions to new situations in the natural environment and maintained use of partner-focused questions at least 2 months postinstruction; one participant required some "booster" instructional sessions 4 weeks postinstruction to maintain her long-term use of partner-focused questions. The participants all reported high levels of satisfaction with the outcomes of the instructional program, as did their facilitators. Members of the general public, blind to the goals of the study, judged the majority of the participants to be more competent communicators after instruction.

KEY WORDS: augmentative and alternative communication (AAC), communicative competence, communication intervention, social-communication skills

Simply providing access to an augmentative and alternative communication (AAC) system will not ensure the development of communicative competence by individuals who have severe speech impairments (Kraat, 1984). Light (1989) argued that the development of communicative competence by individuals who use AAC rests on the acquisition and integration of a variety of skills in four domains: linguistic (i.e., skills in the native languages spoken in the community and skills in the "linguistic code" of the AAC system); operational (i.e., technical skills to operate AAC systems); social (i.e., knowledge, judgment, and skills in the social rules of interaction); and strategic (i.e., compensatory strategies to bypass functional limitations in the linguistic, operational, and social domains). To date, however, there has been only

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limited research to investigate the effect of specific skills (linguistic, operational, social, or strategic) on the perceived communicative competence of people who use AAC and thereby to empirically and socially validate these skills as appropriate goals to be targeted in intervention (e.g., Bedrosian, Hoag, Calculator, & Molineux, 1992; Hoag & Bedrosian, 1992; Light, Beer et al., 1995; Light, Binger et al., 1995; Light, Binger, Dilg, & Livelsberger, 1996). Most of the studies conducted to date have investigated the effect of specific linguistic skills (e.g., message length, grammatical completeness, use of nonobligatory turns). However, sociorelational skills and their impact on communicative competence have largely been ignored.

Light (1989) defined sociorelational skills as such interpersonal communication skills as demonstrating an interest in others, responding to others, participating actively in conversations, putting others at ease, and so on. Warrick (1988) argued that many individuals who use AAC are more challenged by socialrelational inadequacies than by limitations in operational, cognitive, and linguistic skills. According to Warrick's argument, the development of sociorelational skills play a key role in the development of communicative competence. One aspect of sociorelational development that has received some attention in the literature is "other orientation" (Spitzberg & Cupach, 1984). Natural speakers who are competent communicators are "other oriented." They focus on others rather than self; they demonstrate an interest in others, their experiences, and feelings (Argyle, 1969; Spitzberg & Cupach, 1984). A review of measures of interpersonal communication (Rubin & Graham, 1994) indicated that other-orientation skills have been considered to be a key determinant of communicative competence (Wiemann, 1977), communicative adaptability (Duran, 1983), and interpersonal satisfaction (Hecht, 1978). In fact, Feingold (1977) found that other orientation was the best predictor of communicative effectiveness for natural speakers.

One way to demonstrate "other orientation" within communicative interactions is by asking partner-focused questions (i.e., questions directed toward the communication partner that are focused on the partner, his/her interests, and experiences). Light, Corbett, Gullapalli, and Lepkowski (1995) tested the hypothesis that other orientation, demonstrated through the use of partner-focused questions, contributes positively to the perceived communicative competence of individuals who use AAC as judged by three different groups of observers: professionals with experience in AAC, adults without disabilities who had no prior experience in AAC, and adolescents without disabilities who had no prior experience in AAC. The use of partner-focused questions did not seem to affect the judgments of the communicative competence of AAC users made by the adolescents without disabilities. However, use of partner-focused questions did seem to contribute positively to the communicative competence of AAC users according to the judgments of the adult observers. Although learning to ask partner-focused questions may not be critical in interactions with young partners, this skill is an important goal to enhance the social-communication skills of AAC users and to improve their overall communicative competence in interactions with adult partners (Light et al., 1995).

To date, no instructional programs have been developed or evaluated to specifically teach individuals who use AAC to ask partner-focused questions. Therefore, the purpose of the present study was to develop, implement, and evaluate an instructional program to teach individuals who use AAC to ask partner-focused questions in their social interactions with adult partners. The specific research questions addressed were as follows: (a) Does the instruction result in the successful acquisition and spontaneous use of partner-focused questions by individuals who use AAC? (b) Does the instruction result in generalized use of partner-focused questions to new partners and contexts in the natural environment? (c) Does the instruction result in maintenance of the spontaneous use of partner-focused questions after formal instruction ends? (d) Are the acquisition of partner-focused questions and the resulting outcomes valued by the individuals who use AAC and their facilitators (i.e., the significant others in their lives)? (e) Do the use of partner-focused questions and the resulting outcomes enhance the communicative competence of the individuals who use AAC as perceived by the "general public" (adults without disabilities who do not have prior experience in AAC)?

Method

Participants

Six individuals participated in the study. All participants met the following selection criteria according to the report of the participants themselves, their families, and their speech- language pathologists and according to structured observations in naturally occurring contexts conducted by the researchers: (a) The participants' speech was inadequate to meet their daily communication needs (i.e., <75% intelligible to familiar and unfamiliar partners in context). (b) They used AAC (e.g., a computer-based voice output communication aid; a communication board of pictures or traditional orthography; gestures). (c) They had functional hearing and vision. (d) They seldom initiated social interactions with others. (e) They understood basic social conversation and could participate in "displaced talk" (i.e., talk about objects, events, and activities outside the immediate environment). (f) They understood basic question forms in

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context. (g) They could express basic question forms.

Participants were recruited for the study in the following way. Information about the study and the participant selection criteria was distributed to all schools and speech-language service delivery programs in the geographic area. Six individuals who used AAC were nominated by clinicians from these programs. These individuals (and their legal guardians as appropriate) were contacted to confirm their interest in the study. The researchers reviewed current school, medical, and professional reports for the interested participants, conducted structured observations of them interacting socially within their daily routines, and confirmed that they met the selection criteria for the study.

The 6 individuals who used AAC represented a range of ages, disabilities, and AAC systems. The variation was unavoidable given the relatively small number of AAC users in the geographic area. The heterogeneity within the participants prohibited *exact* replication of the intervention effects with participants with similar characteristics but allowed *systematic* replication of the effectiveness of the instructional program across individuals with different disabilities and AAC systems. Table 1 provides a summary of demographic information on the participants. Unless otherwise indicated, this information was obtained through informal assessments of the participants' communication skills using observations of naturally occurring interactions and eliciting contexts (cf. Miller & Paul, 1995).

Maureen

Participant 1, Maureen, was a 44-year-old woman with severe spastic cerebral palsy. She did not have functional use of her hands or legs but had good head control. She used a manual wheelchair and had no independent mobility. She wore glasses to correct her vision to within normal limits. Maureen communicated via four word approximations (i.e., *yeah, no, bad, hey*), eye pointing, facial expressions, head shake/head nod, and a Light Talker—with Language, Learning and Living (LLL) software—controlled by a head-mounted light pointer. The LLL software provided Maureen with a large vocabulary of preprogrammed single words and phrases that she retrieved by selecting various sequences of icons (i.e., colored line drawings that have multiple associations; Jones & Haeusler, 1991). She also used personalized vocabulary that had been added to meet her individual communication needs, including sentences, carrier phrases, and single words. Maureen had been institutionalized as a young child; she had moved out of the institution into a group home when she was in her thirties. She attended a sheltered workshop and was actively involved in an advocacy group for people with disabilities.

Mike

Participant 2, Mike, was a 25-year-old man with severe cerebral palsy. He did not have functional use of his hands or legs and was dependent in all activities of daily living. He used a manual wheelchair but was awaiting a powered chair to allow independent mobility. Mike communicated by means of eye pointing, a communication book of words and line drawings, and a computer-based voice output system—a Liberator with Words Strategy software—which he controlled via row-column scanning with a single head-mounted switch. The Word Strategy software included a prestored core vocabulary of more than 2,000 words and short phrases, retrieved through the selection of combinations of icons and grammatical labels (Baker, 1991). Mike occasionally used letter-by-letter spelling to communicate as well. He lived at home with his mother in a small town in a rural area. He was not employed.

Rob

Participant 3, Rob, was a 33-year-old man who had moderate mental retardation according to psychological reports. He had good motor function and walked independently. Informal assessment indicated that he understood basic social conversation (see Table 1). He used various means to communicate, including natural speech, gestures, a communication book of line drawings, and a portable computer-based voice output system: a Walker Talker. He retrieved prestored messages represented by line drawings on the Walker Talker via direct selection with the index finger of his right hand. Rob lived in a group home and attended a sheltered workshop.

Jim

Participant 4, Jim, was a 35-year-old man who had experienced a head injury in a motor vehicle accident 15 years earlier. His vision was 20/50 and 20/40 in the left and right eyes respectively; he had nystagmus and had difficulty focusing on small print. According to neuropsychological reports, Jim's performance on the Weschler Adult Intelligence Scale–Revised demonstrated difficulties with both simple and complex tasks that required sustained attention and concentration. Jim used a manual wheelchair that he could propel independently for short distances. He had functional use of both hands, but his motor responses were slow. He used natural speech as his primary means of communication and used oral spelling to clarify his speech. At the time of the study, Jim was learning how to use a computer-based voice output system, an IBM-compatible laptop with a Multivoice speech synthesizer and EZ Keys software, which he controlled via direct selection on the standard keyboard. The EZ Keys software allowed him to retrieve frequently used prestored messages using logical letter

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Table 1. Demographic information on the participants.

Participants	Age	Sex	Disability	AAC Systems	Receptive language skills	Expressive skills
#1 Maureen	44	F	CP Seizure disorder	Vocalizations; eye pointing; head nod/shake; Light Talker with LLL software (head mounted light pointer)	PPVT test score <1%tile (5;5 yrs). In functional context, responds with >80% accuracy to simple wh-questions; 1–2-step commands; basic prepositions (*in*, *on*, *under*, *in front of*). Responds with <50% to wh-questions using complex forms, reversible passive sentences, & unfamiliar 3-step commands. Nonliterate.	Uses telegraphic phrases (e.g., "wheelchair fix Saturday"); relies on partner to co-construct message; >80% contingent responses to partner's questions; seldom initiates; communicates about recent experiences and interests.
#2 Mike	25	M	CP	Eye pointing; communication board; Liberator with Words Strategy (single switch scanning)	In functional context, responds with >80% accuracy to 1–3-step oral commands and simple and complex wh-questions. Difficulty (<50% accurate) with grammatical morphemes such as past tense & sentences with embedded clauses. Basic literacy skills (Woodcock Johnson Reading Test grade 3.5).	Communicates in simple sentences; omits or makes errors with many grammatical morphemes; >80% contingent responses to partner's questions; seldom initiates conversation; demonstrates functional spelling skills (>80% intelligible).
#3 Rob	33	M	Mod. MR	Speech (approx. 20% intelligible to unfamiliar partners); gestures; Walker Talker; communication book with line drawings	In functional context, responds with >80% accuracy to simple wh-questions (what, what (X) doing, where, how); 1-step commands; S-V-O word order; basic prepositions. Responds with 70% accuracy to basic why & when questions. Responds with <50% accuracy to 2–3-step commands and complex wh-questions. Recognizes basic sight word vocabulary.	Communicates in short spoken sentences (e.g., "I don't like it"); repeats or uses gestures & aided AAC to clarify; >80% contingent responses to partner's simple questions; seldom initiates; communicates about recent experiences, interests, and goals.
#4 Jim	35	M	TBI	Speech (20–30% intelligible to unfamiliar partners & 50–80% to familiar partners in context); oral spelling; gestures; IBM compatible laptop with EZ Keys software	Receptive language skills within normal limits on CADL. In informal conversation, responds with >90% accuracy to simple and complex wh-questions, 1–3-step commands, various morphological structures. Reading performance on WRAT at 19%tile (z = 87).	Communicates via speech in syntactically correct compound & complex sentences; uses repetition, oral spelling, gestures, & IBM to clarify; responds contingently; initiates, but approx. 60% of initiations are inappropriate; spelling skills are >90% intelligible in context; spelling performance on the WRAT at 13%tile (z = 83).
#5 Matt	13	M	Mod. MR	Some speech (35–45% intelligible with unfamiliar partners); pointing; gestures; Dynavox (direct selection with touch screen)	In functional context, responds with >80% accuracy to simple wh-questions; 1–2-step commands; basic prepositions (*in*, *on*, *under*, *in front of*). Responds with <50% accuracy to reversible passive sentences, complex wh-questions, unfamiliar 3-step commands. Preliterate.	Uses spoken telegraphic phrases; relies on partner to co-construct message; responds contingently to >80% of simple partner questions with *yes/no* or short answer; seldom initiates; communicates about recent experiences and interests.
#6 Laurie	10	F	CP	Eye pointing; pointing; vocalizations; Dynavox (direct selection with touch screen)	In functional context, responds with >80% accuracy to simple what, what (X) doing, where, & how questions & with approx 75% accuracy to why & when questions. Responds with >80% accuracy to familiar 1–2-step commands & basic prepositions. Responds with <50% to 3 step commands and complex wh-questions. Preliterate.	Communicates using prestored single words and short sentences; responds contingently to >80% of simple partner questions with *yes/no* or short answers; seldom initiates; communicates about recent experiences and interests.

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codes and also provided linguistic prediction (i.e., the software offered predictions of the target word as Jim typed each letter). He used a large font (22 point) to accommodate his visual impairment. He lived with his parents in a small town. He was not employed and was not involved in a work training program.

Matt

Participant 5, Matt, was a 13-year-old boy who had a developmental disability with a moderate cognitive impairment according to school psychological reports. His corrected vision was within normal limits. He was able to walk independently and had good hand function. Informal assessment indicated that Matt understood basic social conversations; he performed best when language input was concrete and specific (see Table 1). Observations of naturally occurring interactions indicated that Matt expressed his needs and wants by means of a limited vocabulary of spoken words, pointing, gestures, and a computer-based voice output communication aid (a Dynavox) that he controlled via the touch screen using the index finger of his right hand. He had approximately 300 vocabulary items (represented by line drawings) preprogrammed into his Dynavox, including full sentences, carrier phrases, and single words. The Dynavox was mounted on a small cart that he pushed around with him. Matt lived at home with his parents and older siblings. He attended a special education life skills support class at a middle school and was mainstreamed with his age-level peers for nonacademic classes. His teachers and parents reported that he was quite shy.

Laurie

Participant 6, Laurie, was a 10-year-old girl who had cerebral palsy. She had a visual impairment but was able to see letters or line drawings approximately 1/2 inch in size at a distance of up to 2 feet. She had limited function of her hands and arms. She used a walker to walk short distances, but was more typically seated in a powered wheelchair. She used a variety of means to communicate, including vocalizations, eye pointing, pointing, and a computer-based voice output system (a Dynavox) that she controlled via direct selection on the touch screen with her right thumb. She communicated via prestored sentences and short phrases stored on the Dynavox. Laurie attended a life skills program in an elementary school.

Design

The study employed a single-subject, multiple-probe design (cf. Kearns, 1986; Tawney & Gast, 1984). With 6 participants in the study, it was anticipated that Participants 4, 5, and 6 would spend a significant amount of time in baseline awaiting intervention while Participants 1, 2, and 3 learned the targeted skill. This prolonged baseline raised obvious ethical issues. In order to address this concern, the study employed a multiple- probe design across three participants (Participants 1, 2, and 3) and replicated the design concurrently across three additional participants (Participants 4, 5, and 6). All participants were functionally independent of each other; they lived in different areas and participated in different educational/vocational programs.

The investigation involved three experimental conditions: baseline before instruction; instruction in the use of partner-focused questions; and generalization and maintenance probes after instruction. Baseline measures were obtained for the target-dependent behavior (i.e., percentage of spontaneous use of appropriate partner-focused questions out of available opportunities) through observations of each of the participants communicating with others in social interactions during their daily routines. A minimum of three baseline observations were conducted for each participant until a stable baseline was established. Once stability was obtained for the target behavior in baseline, then instruction was instituted with participants individually in a sequential manner for Participants 1, 2, and 3 and for Participants 4, 5, and 6, respectively. While instruction was initiated with Participant 1 and Participant 4, the other participants remained in baseline; their use of partner-focused questions was probed periodically during baseline. Once treatment effects were demonstrated with one participant, then instruction was instituted with the next participant and so on until all participants had received instruction. Once participants reached criterion for the target behavior (i.e., spontaneous use of appropriate partner-focused questions in at least 80% of the opportunities available during two consecutive instructional sessions), generalization probes were conducted within the participants' natural environments to ensure that the participants had generalized the use of partner-focused questions to new partners and contexts. Observations of the participants interacting in the natural environment continued at regular intervals (i.e., 2 weeks, 4 weeks, 8 weeks) postintervention to ensure that the participants maintained generalized use of partner-focused questions after formal instruction ended.

Instructional Procedures

Vocabulary

Between 5 and 10 partner-focused questions were selected individually for the participants using the following criteria: (a) easily understood by the participants and their partners, (b) useful in a variety of contexts across different conversational topics and partners, and (c) age appropriate (e.g., "What's up?" "How was your weekend?" "What did you do last night?"). The questions

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were preprogrammed into each participant's voice output communication aid as full messages so that they could be communicated efficiently. Additional questions were added as required during instruction. Two of the participants also generated novel partner-focused questions: Mike did so via the single-word vocabulary prestored in his Liberator; Jim did so via natural speech and letter-by-letter spelling on his IBM laptop.

Instructional Contexts

The researchers met with each of the participants and instructors to identify contexts in which the participants would benefit from asking partner-focused questions. For example, in Maureen's case, contexts included brief social interactions with staff, friends, peers, and visitors at the sheltered workshop, group home, community settings, and the disability advocacy group; in Laurie's case, contexts included brief social interactions at school and dance class with teachers, school staff, and volunteers. Three to four contexts were selected from the list for initial instruction with each participant using the criteria enumerated by Light and Binger (1998): (a) situations that occurred frequently, (b) situations that were highly motivating, (c) situations in which the individual was likely to benefit from the use of partner-focused questions, (d) situations that presented the greatest opportunity for successful performance, and (e) situations that were convenient for the instructor. Additional contexts and partners were added for each participant as instruction progressed. Generalization probes were conducted in contexts that were taken from the list originally generated by the participants and their facilitators but that had not been practiced previously during instruction. During the instructional and generalization contexts, the participants interacted with at least five different partners, including both unfamiliar and familiar partners; most of the partners were familiar. Partners were not provided with formal instruction as part of this study, although some of the familiar partners had received training before the study as part of previous clinical interventions. The partners were reminded to allow the participants an opportunity to communicate; these reminders were provided during baseline, instruction, and generalization/maintenance conditions. The partners were not instructed to use specific verbal cues to mark the opportunity for a partner-focused question. There was variation across the interactions as would be expected in naturally occurring interactions.

Teaching the Use of Partner-Focused Questions

The general instructional procedures implemented were as follows. First, the instructor explained the goal to the individual who used AAC and discussed the importance of asking partner-focused questions. The individual who used AAC then observed the instructor (or another AAC user, if possible) asking partner-focused questions in social interactions. During the demonstrations, the instructor provided "think-aloud" statements explaining when, how, and why to ask partner-focused questions. The instructor asked the individual who used AAC to think of situations within the daily routine in which he or she should ask partner-focused questions.

The individual was then provided with multiple opportunities (at least 10 in each instructional session) to practice asking partner-focused questions. Approximately 50% of the instruction was implemented during social interactions in the natural environment; this practice was supplemented with role-plays of naturally occurring interactions (approximately 50%). In the former case, the instructor accompanied the individual who used AAC into the natural environment and remained as inconspicuous as possible, providing prompting support only as required to ensure that the individual successfully asked an appropriate question. The role-plays replicated naturally occurring interactions within the individual's daily life. They were not scripted; rather the communicative turns were varied to simulate the range found in naturally occurring interactions. The individual was always provided with the opportunity to ask a partner-focused question spontaneously following a *natural cue* to do so (see the section on Measures below for an operational definition of a natural cue). The instructor used a least-to-most prompting hierarchy as required if the individual did not ask an appropriate partner-focused question spontaneously when the natural cue occurred. The prompting hierarchy was as follows: (a) expectant delay (i.e., look at the individual using AAC with an expectant facial expression and wait for an extended period, approximately 10–15 seconds); (b) point (i.e., point toward the individual or his/her AAC system(s) in a general manner, look at the individual expectantly, and wait for an extended period); and (c) model (i.e., model the correct use of a partner-focused question using the individual's AAC systems, then look at the individual using AAC, and wait expectantly for an extended period). In order to ensure that the participants did not repeatedly practice "incorrect" behaviors, correction procedures (i.e., a model) were instituted immediately whenever the individual asked a partner-focused question that was inappropriate or produced a turn other than a partner-focused question when one was required. Data on the learner's spontaneous use of appropriate partner-focused questions for each opportunity were collected in every instructional session. The individual using AAC was provided with feedback on his/her performance immediately following each instructional session (i.e., verbal praise for each successful use

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of a partner-focused question and discussion of each situation in which the individual was not successful, with examples of questions that could have been asked). Instruction continued until the individual met criterion (i.e., asked appropriate partner-focused questions spontaneously in at least 80% of the available opportunities in at least three or four different situations, during two consecutive instructional sessions). (Readers are referred to Light & Binger, 1998, for further details on the instructional procedures.)

Training the Instructors

The on-site professionals who provided regular services to the participants were asked to implement the instruction in this study in order to ensure that the instructional techniques were not only effective but also were practical. For Participants 1, 2, and 6, instruction was provided by a speech-language pathologist (SLP) who had 4 or more years of experience in AAC; for Participants 3 and 4 by a graduate student under the supervision of a qualified SLP; and for Participant 5 by his classroom teacher in consultation with an SLP. The instructors received written documentation of the instructional procedures. They observed the first or second author implementing the procedures with the individual who used AAC and then practiced implementing instruction with the individual under the supervision of the researchers until the on-site professionals reached an agreement of 90% or greater with the instructional standard (as documented in the written procedures) in at least two consecutive sessions. Procedural reliability checks (Billingsley, White, & Munson, 1980; Peterson, Homer, & Wonderlich, 1982) were conducted by the researchers on randomly selected instructional sessions, representing at least 15% of the sessions for each of the participants. The mean procedural compliance with the standard for the six instructors was 96% agreement (ranging from 95.5% to 98.9%).

Measures

The dependent variable of interest was the spontaneous use of appropriate partner-focused questions. Partner-focused questions were operationally defined as questions about communication partners, their interests, and their experiences. The majority of the partner-focused questions selected by the participants were simple wh-questions (e.g., "How are you?" "What are you doing tonight?"), although some took other forms (e.g., "Do you like to fish?" "Catch any lately?"). The natural cues marking an opportunity for a partner-focused question were operationally defined as follows: (a) at the start of an interaction when the individual who uses AAC is within physical proximity of the partner; (b) during a conversation when the partner makes a comment about a personal experience, thought, or feeling and then makes eye contact and pauses to relinquish the floor as speaker (e.g., the partner says "I can't wait until this weekend," providing the opportunity for the individual who uses AAC to ask a partner-focused question such as "What are you doing?"); (c) at any point during a conversation when there is a pause of greater than 10 seconds in which no one claims the floor as the speaker; and (d) during a conversation immediately after the individual who uses AAC responds to a partner's question (e.g., the partner asks, "How was your weekend?"; the individual who uses AAC responds, "Great. I went to the game," and then has the opportunity to ask a partner-focused question immediately (e.g., "How about you?"). Thus, partner-focused questions could serve to initiate a new conversation or to extend a conversation by further developing the topic. The conversational role of the question was not coded within this study; partner-focused questions that served to initiate conversations were not differentiated from those that served to extend conversations. Each opportunity to ask a partner-focused question was coded as an occurrence (i.e., the individual asks an appropriate partner-focused question spontaneously when the opportunity occurs) or a nonoccurrence (i.e., the individual does not ask a partner-focused question following the natural cues to do so, requires prompting support—that is, an expectant delay, point, and/or model—to ask a partner-focused question, or asks a partner-focused question that is inappropriate to the conversational context). Data on the percentage of spontaneous partner-focused questions during baseline, instruction, generalization, and maintenance were collected for each of the 6 participants by on-site professionals through direct observational recording procedures. Most sessions were videotaped as well. All instructors were trained in the data collection procedures until they met the defined standard with at least 90% accuracy. Interobserver agreement checks for the dependent measures were conducted on randomly selected sessions representing at least 15% of the sessions during the baseline, instruction, and generalization/maintenance phases. Observational data collected by the on-site professionals were compared to data collected by the researchers either on-line or through review of videotaped sessions. The mean interobserver agreement (number of agreements divided by the number of agreements plus disagreements plus omissions) across the 6 participants was 95.7% (range: 90.5% to 100%).

Data Analysis

Data were analyzed using the systematic visual inspection techniques recommended for single-subject experimental designs (Tawney & Gast, 1984). Frequencies of the dependent behavior (partner-focused questions),

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divided by the number of opportunities to ask partner-focused questions, multiplied by 100, were tabulated for each observational session during the baseline, instruction, generalization, and maintenance conditions. Data were summarized as percentages in graphic form and were visually inspected to determine changes in the level and slope of data across the experimental conditions.

Social Validation

As recommended by Kazdin (1977) and Schlosser (in press), the outcomes of the instructional program were socially validated to ensure that they were truly functional and valued by the stakeholders. Two social validation procedures were used. During interviews after the instructional program, the participants were asked whether they were more effective communicators after instruction, whether they were less effective, or whether there was no change in their effectiveness after instruction. Their facilitators were asked similar questions in writing. As a second measure of social validity, 20 adults without disabilities who had no prior experience in AAC were asked to judge the communicative competence of the individuals using AAC, pre- and postinstruction. These observers were blind to the goals of the study. Videotapes of interactions during the pre- and postinstruction phases for each of the individuals using AAC were presented to the observers in random order; the observers were blind to the status of the videotapes (i.e., baseline or postinstruction). After viewing the videotapes, the observers were asked to indicate whether the individual using AAC was a more competent communicator in the first or second videotape observed or to indicate that there was no difference in the individual's communicative competence between the two videotapes. Data were summarized and analyzed separately for each of the 6 participants using chi square analyses.

Results

Figure 1 presents data on the spontaneous use of appropriate partner-focused questions by the 6 participants for each of the three phases of the study (baseline, instruction, and generalization/maintenance). Comparisons of the participants' performances at baseline with those during the generalization and maintenance phase postintervention provide clear evidence of the effectiveness of the instruction.

Acquisition of Partner-Focused Questions

All of the participants successfully learned to ask partner-focused questions during the instruction. The number of instructional sessions required before the participants met criterion varied, ranging from 4 to 14 sessions (approximately 3 to 11 hours of instruction). One of the participants, Participant 6, Laurie, required some additional instruction 4 weeks postintervention to ensure her long-term maintenance of the skill (see the section on Maintenance below for further discussion). Table 2 provides transcripts of two interactions involving Participant 5, Matt, before and after instruction. These transcripts are typical of the interactions involving the 6 participants. As is evident from the baseline transcript in Table 2, before instruction Matt seldom initiated interactions with others; his participation in social conversations was limited to brief responses to the questions that his partners asked him. His conversations were typically self-focused; he did not demonstrate other-orientation skills. He never asked his partners questions; he seldom expanded or extended topics of conversation. After instruction, Matt was a much more active participant in communicative interactions with others. He initiated and extended topics of conversation by asking partner-focused questions; he demonstrated "other-orientation" skills (see Table 2).

Generalization of Partner-Focused Questions

All of the participants generalized use of partner-focused questions to new partners and new situations encountered in their natural environments postinstruction. Participant 4, Jim, experienced initial difficulties generalizing from instructional sessions to new situations in the natural environment; in the initial generalization probes immediately following instruction, his spontaneous use of partner-focused questions was only 33% and 29%. However, his performance improved significantly in subsequent generalization probes; all subsequent probes exceeded 80% spontaneous use of partner-focused questions (see Figure 1).

Maintenance

Probes of the participants' use of partner-focused questions continued for at least 2 months after instruction ended to ensure that the participants maintained the new skill. Four of the 6 participants successfully maintained their use of partner-focused questions at or above criterion (i.e., 80%) during social interactions in their natural environments for at least 2 months after formal instruction ended. Two participants showed some decline in their performances postinstruction, although their use of partner-focused questions remained significantly above baseline levels. Maureen's performance declined to 67% eight weeks postinstruction (see Generalization and Maintenance Session 6 for Maureen in

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Figure 1a. Percent spontaneous use of partner-focused questions out of available opportunities for each participant during baseline, instruction, and generalization and maintenance phases.

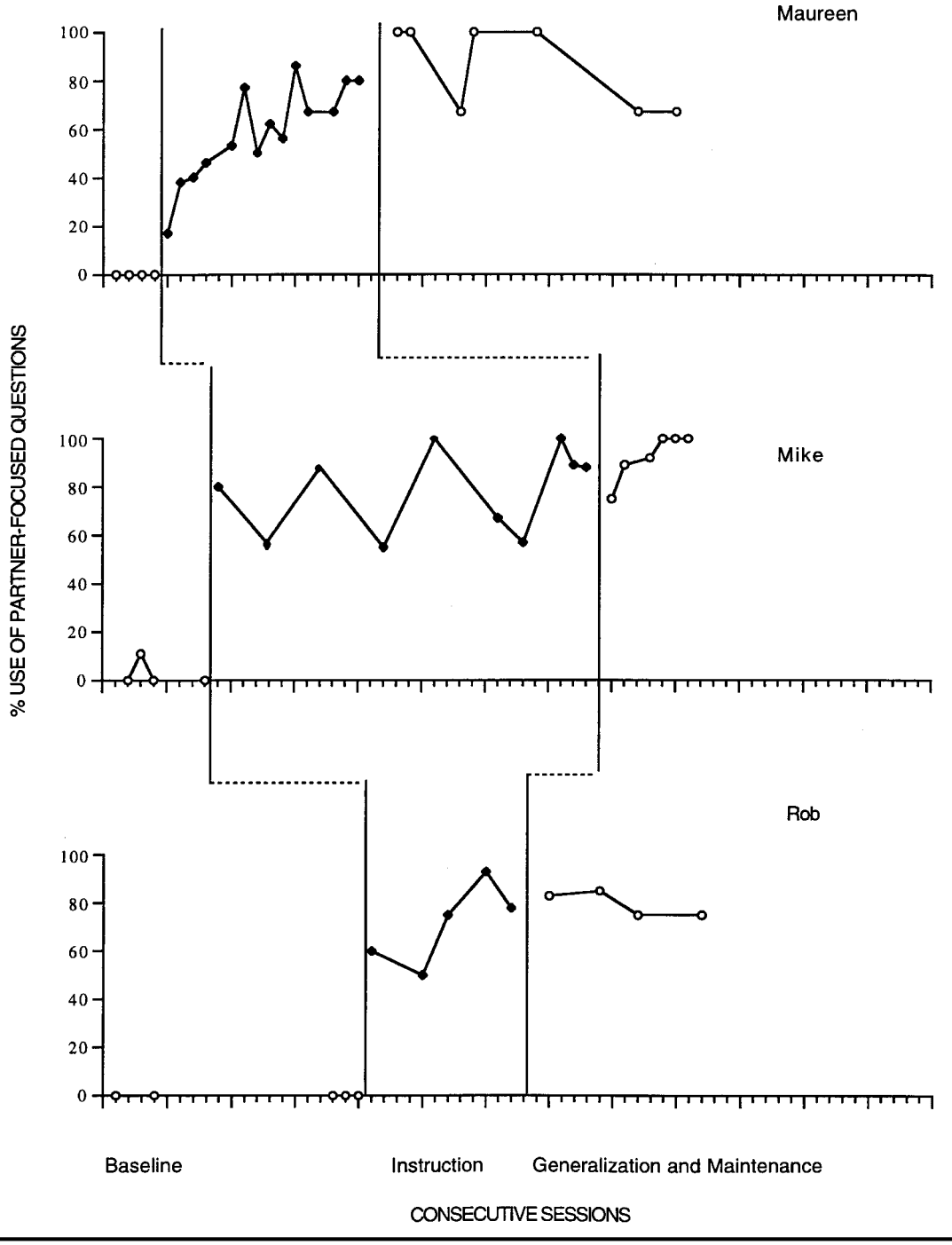

Figure 1). A follow-up probe was conducted 2 weeks later (10 weeks postinstruction) to monitor her maintenance; during this probe, she again performed at 67% accuracy. Although this level represented a decline from criterion, it still represented a significant increase over her baseline performance levels. Discussion with Maureen and her facilitators indicated that they were satisfied with this level of performance; all described significant positive changes in her interaction patterns. Maureen and her facilitators decided not to pursue further instruction in partner-focused questions, but to monitor her continued use of partner-focused questions to ensure long-term maintenance.

Participant 6, Laurie, maintained her use of partner-focused questions above criterion level 1 month

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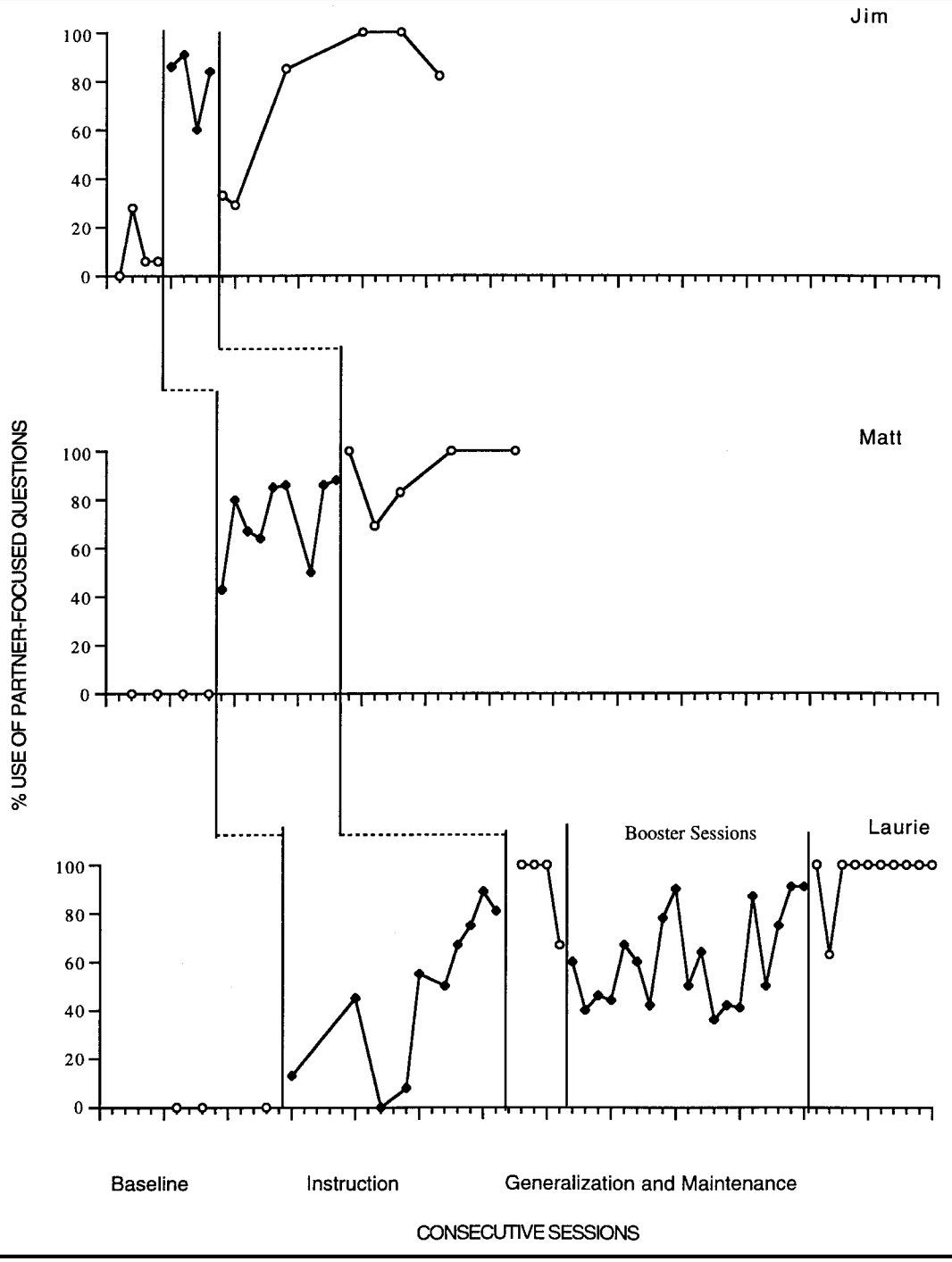
Figure 1b. Percent spontaneous use of partner-focused questions out of available opportunities for each participant during baseline, instruction, and generalization and maintenance phases.



postinstruction. Subsequent to the 4-week maintenance probe, however, there was a period of extended school holidays during which Laurie was ill. After the holidays, during the maintenance probe 6 weeks after instruction, Laurie's performance showed a decline; she asked appropriate partner-focused questions spontaneously in 66% of her opportunities. Although this performance was still substantially above her original baseline levels of 0%, her facilitators expressed concern about her long-term maintenance of this skill. Therefore, additional instructional sessions were implemented as "booster" sessions. Laurie required an additional 19 instructional sessions (approximately 9–10 hours of instruction) to reach criterion again. After these booster sessions, she demonstrated generalized use of partner-focused questions in naturally occurring interactions within her daily routine

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Table 2. Examples of Matt's communication in naturally occurring interactions pre- and postinstruction.

Communicator	Communicative turn
Interaction with a familiar visitor at school during baseline, before instruction	
Visitor:	"Hi."
Matt (via speech):	"Hi."
[pause]	
[Matt misses an opportunity for a partner-focused question.]	
Visitor:	"How are you doing this morning?"
Matt (via speech):	"Okay."
[Matt misses an opportunity for a partner-focused question.]	
Visitor:	"What are you doing today?"
Matt (via speech):	"We go."
[Conversation continues about the field trip with volunteer asking questions and Matt answering.]	
[long pause]	
[Matt misses an opportunity for a partner-focused question.]	
Interaction with the physical education teacher in the hall at recess (postinstruction)	
Mr. Brown:	"Hi, Matt."
Matt (via speech):	"Hi."
Matt (via AAC system):	"How are you?"
[Matt asks a partner-focused question spontaneously.]	
Mr. Brown:	"Pretty good."
Matt (via AAC system):	"How are your dogs doing?"
[Matt asks a partner-focused question spontaneously.]	
Mr. Brown:	"My dogs are good."
[Conversation continues about dogs for several turns.]	
Matt (via AAC system):	"Have you gone fishing lately? Catch any?"
[Matt asks a partner-focused question spontaneously.]	
Mr. Brown:	"No. How 'bout you? D'you like to fish?"
[Conversation continues about fishing for several turns and then about horses.]	
Matt (via AAC system):	"Are you going to dress up for Halloween?"
[Matt asks a partner-focused question spontaneously.]	
Mr. Brown (laughs):	"I already am! Are you?"
Matt (via speech):	"Yeah. Orange suit."
Mr. Brown:	"I bet you're gonna be a hunter."
Matt (via gesture):	Nods

and maintained spontaneous use of partner-focused questions during weekly probes that continued over a 2-month period after the booster sessions ended.

Social Validation

The measures of social validation supported the quantitative observations of positive changes in the communication of the AAC users. All (100% percent) of the participants reported that they were more effective communicators as a result of the instruction; many indicated anecdotally that people interacted with them more frequently and for longer periods once they started to ask partner-focused questions. All of the facilitators (e.g., teachers, parents, residential counselors) concurred that the use of partner-focused questions had enhanced the communicative competence of the AAC users; all reported improvements in the quality of interactions with the individuals who used AAC. For example, one facilitator made the following comment that was typical of the responses: "It was surprising to note the reaction of communication partners when [individual's name] asked a question. They showed pleasure and surprise. They seemed happy to share in the conversation."

As a measure of the value of the instruction and its outcomes from the perspective of the general public, 20 adults who had no prior experience in AAC and who were blind to the goals of the instruction were asked to judge the communicative competence of the AAC users. The majority of the adults judged 4 of the 6 participants (Maureen, Mike, Matt, and Laurie) to be more competent communicators in the interactions videotaped postintervention. In their explanatory comments, the observers indicated that the participants were more competent in these interactions because (a) they seemed more interested in the conversation and the partner; (b) they asked more questions; and (c) they seemed more interactive, more involved, and "carried the conversation more." The majority of the adults reported no clear difference in the communicative competence of two of the participants (Jim and Rob) between the baseline and postinstruction videotapes.

Discussion

The discussion addresses two issues with respect to the results of this study: (a) factors that may have contributed to the effectiveness of the instruction, and (b) implications of the social validity results.

Factors Contributing to the Effectiveness of the Instruction

The instruction resulted in the successful acquisition, generalization, and maintenance of partner-focused questions by the participants; understanding *why* the instruction was effective is important to further develop "best practices" in the AAC field. There may have been several factors to account for the success of the instructional procedures in facilitating spontaneous and generalized use of partner-focused questions. The literature suggests that learners typically have problems with

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spontaneity and generalization when a new skill is taught in a single situation (or a limited number of situations) with the same partner (in isolation from the natural environment) and when each instructional session is practiced in the same manner following the same "script" (Light & Lindsay, 1991). When instruction follows this format, the individual has no opportunity to learn to use the new skill in response to a range of natural cues. In order to facilitate spontaneous and generalized use of partner-focused questions, the instructional procedures in this study incorporated the following techniques: (a) Instruction was conducted in interactions with a variety of partners in a range of situations. (b) Natural cues were used to signal opportunities to ask partner-focused questions within these interactions. (c) The natural cues were varied. (d) Natural consequences were used in response to the partner-focused questions (i.e., the partner responded conversationally when the individual who used AAC asked a partner-focused question). (e) A least-to-most prompting hierarchy was used, allowing the participants the opportunity for spontaneous independent performance each time a partner-focused question was required and minimizing their dependency on the prompting support of others (Calculator & Jorgensen, 1991; Reichle & Sigafoos, 1991; Schlosser & Braun, 1994; Sigafoos, Mustonen, DePaepe, Reichle, & York, 1991). Instruction was conducted within the participants' natural environments as much as possible to ensure that the skill taught was relevant and that the experiences were familiar and meaningful to the learner. However, because learning depends on repeated opportunities to practice new skills, simulations of real-world situations were also used in this study to supplement practice in real world interactions. The literature suggests that role-plays can be an effective technique to provide opportunities for repeated practice of new skills provided they replicate the real world as closely as possible, incorporate natural cues, and provide natural consequences (Calculator, 1988; Nietupski, Hamre-Nietupski, Clancy, & Veerhusen, 1986).

The instructional procedures not only facilitated spontaneous and generalized skill use, but also seemed to foster long-term maintenance of skill use. The procedures may have supported maintenance in at least three ways: (a) The new skill was taught to a high criterion (i.e., 80%) during instruction in order to ensure mastery. (b) Participants had repeated practice asking partner-focused questions in their daily routines, thus replacing their old patterns of interaction with new ones. (c) Regular observations of the participants were conducted after instruction finished in order to monitor any decrease in performance so that remedial action could be undertaken immediately before further deterioration was noted.

Two of the participants did show some decline in their spontaneous use of partner-focused questions 6 to 8 weeks after instruction ended. It should be noted, however, that both of these participants maintained performance levels well above baseline levels despite the declines. The reasons for the declines in Maureen's and Laurie's performances are not clear. The declines may have resulted from a lack of opportunity to ask partner-focused questions within their daily routines. For example, Laurie's decline occurred after an extended period of school holidays during which Laurie was ill; she had limited access to her AAC systems and to communication partners during this time. If this explanation is correct, then the results emphasize the need for concerted training of facilitators to ensure that they continue to provide opportunities for individuals who use AAC to ask partner-focused questions within daily interactions even though formal instruction is finished.

It may be that the initial criterion level (i.e., 80% spontaneous use of partner-focused questions) was set too high. This criterion level was established after the researchers carefully considered the following issues enumerated by Wolery, Bailey, and Sugai (1988): the level of skill performance required to function effectively in the real world, the level required for the individual to benefit, the level required to move on to the next skill, the level required to ensure long-term maintenance, and the level at which others perform the skill. Because there were no data available on the frequency with which natural speakers use partner-focused questions, the decision relied heavily on an estimate of the level required to ensure benefit from and long-term maintenance of the skill. However, Maureen and her facilitators reported satisfaction with lower levels of performance (i.e., 67%); they also reported continued positive benefits from asking partner-focused questions at this lower rate. Future research is required to investigate an appropriate criterion level for instruction in partner-focused questions.

Implications of the Social Validity Results

The social validity results support the conclusions drawn by Light et al. (1995); they suggest further evidence of the validity of targeting partner-focused questions as an intervention goal to enhance the perceived communicative competence of individuals who use AAC in their interactions with adults. The social validity measures indicated that the outcomes of the instructional program were valued by all of the participants who used AAC and their facilitators. Most of the participants (4 of 6) were also perceived to be more competent communicators as a result of the instruction by members of the general public who had no prior experience in AAC. These results are encouraging, given the

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relatively short amount of time spent in instruction (an average of 6 hours, ranging from approximately 3 to 11 hours of instruction across the participants). Significant changes in communication effectiveness were effected in a relatively short amount of time.

It is important to note that the data collection procedures in this study did not differentiate between partner-focused questions that were used as initiations and those that were part of response-recodes (i.e., communicative turns in which the individual first responds to the partner's question and then immediately asks a question, according to the definition used by O'Keefe & Dattilo, 1992). Therefore, it is not possible to disentangle the impact of the increase in partner-focused questions from the effects of increased initiations or increased turn-taking. Future research is required to address this issue.

It should also be noted that there were two participants in the study who were not perceived by the "general public" to be more competent communicators as a result of the instruction, although these participants reported high levels of satisfaction with the instruction and its outcomes as did their facilitators. Several explanations may account for this finding. The video clips viewed by the adults who had no prior experience in AAC were short (each approximately 2 minutes in length); as a result, there were not many opportunities for the individuals to ask partner-focused questions in these interactions. The adult observers may not have viewed a large enough sample of interaction to evaluate the communicative competence of the individuals using AAC or to realize the full impact of their asking partner-focused questions. Alternatively, it may have been that teaching these two individuals to ask partner-focused questions was not sufficient, in and of itself, to affect perceptions of their overall communicative competence positively. Light (1989) argued that communicative competence is founded on a complex interaction of linguistic, operational, social, and strategic skills; increases in one skill, such as the use of partner-focused questions, may not have been sufficient to affect these participants' overall communicative competence as judged by members of the general public.

Directions for Future Research

The results of this investigation suggest the validity of targeting partner-focused questions as a goal to enhance the communicative competence of individuals who use AAC and suggest the effectiveness of the instructional procedures as a means to teach this skill. There are, however, a number of questions that remain unanswered. Future research is required (a) to establish the generality of the results across a broader range of individuals who use AAC; (b) to adapt, implement, and evaluate the general instructional procedures used in this study to teach other communication skills to individuals who use AAC; (c) to investigate the impact of specific procedures within the general instructional model to identify the components necessary for successful outcomes and to determine if the instructional procedures can be streamlined, while still maintaining their effectiveness (e.g., the pointing prompt was used infrequently in the present study and may not be an essential element of instruction); (d) to investigate appropriate criterion levels for various communication skills to maximize benefit and foster long-term maintenance; (e) to compare the relative effectiveness of various instructional approaches to establish those that are most effective and efficient; and (f) to determine which AAC users benefit most from which types of instructional approaches. This study provides initial steps in identifying effective instructional procedures to teach communication skills that affect the perceived communicative competence of individuals who use AAC. Future research is required to elaborate these first steps and thereby determine exemplary practices to promote the communicative competence of individuals who use AAC.

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