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Applying the Diagnostic Intervention Model for Fostering Harmonious Interactions Between Deaf-Blind Children and Their Educators: A Case Study

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Abstract: This article demonstrates the use of the Diagnostic Intervention Model in everyday practice and the effects of its application in a case study of Kris and his educator using individual coaching. The implications of the case for everyday practice are discussed.

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In an earlier article (Janssen, Riksen-Walraven, & van Dijk, 2003b), we presented the Diagnostic Intervention Model for use as a guide in the design and conduct of interventions to foster harmonious interactions between children who are deaf-blind and their educators in various settings. An interaction coach, who consults with and supervises the educators, plays a central part in

the diagnostic intervention process. As Box 1 shows, the interaction coach aims to foster harmonious interactions between a deaf-blind child and his or her educator by improving the educator's ability to recognize the child's signals, attune his or her behaviors to those of the child, and adapt the interactional context to promote the occurrence of a particular child's behaviors. The intervention is designed, carried out, and evaluated using a five-step intervention protocol that is depicted in Box 1.

After the coach has determined and clarified the questions for interaction coaching for a child who is deaf-blind (Steps 1 and Step 2 in the intervention protocol), observations of interactions between the child and the educators are taken as the basis for the formulation of intervention aims (goals for intervention) in terms of eight core categories of interactive behavior (Step 3). Next, the intervention is carried out (Step 4), and the effects of the intervention are assessed in terms of the same set of behavioral categories (Step 5). These observations may then be taken as the starting point for a new intervention cycle (Daelman, Nafstad, Rødbroe, Souriau, & Visser, 1996; De Bruyn, Pameijer, Ruijssenaars, & van Aarle, 1995; Dekker & Biemans, 1994; Janssen, Riksen-Walraven, & van Dijk, 2004; Rowland & Scheigert, 1997; Trevarthen, 1993; Weiner, Kuppermintz, & Guttman, 1994).

In an earlier study (Janssen, Riksen-Walraven, & van Dijk, 2003a), the effectiveness of the Diagnostic Intervention Model was shown in a sample of six deaf-blind children and their 14 educators. The present article demonstrates the application of the model in everyday practice by describing a single case from the former study--that of Kris--in more detail. After the case is described, the assessment of the effects of the intervention for Kris and his educator is discussed. Finally, we go further into the most important implications of the case for everyday practice (Janssen, van den Tillaart, van der Heijden, van Duijnhoven, &

van Son, 2002).

The case of Kris

Kris and his educators

Kris, a 10-year-old boy, is deaf (an average hearing loss of about 110 dB in his left ear and about 105 dB in his right ear) and blind (with some light perception) owing to the congenital rubella syndrome. Kris became blind just four months before the beginning of the study because of glaucoma. Before he became blind, he had low vision and used about 100 drawings as formal means of communication. About 50 drawings were then translated into tactile symbols in a reference book. At the time of the study, Kris used five tactile symbols (for shower, bath, play, eating, and sleeping) and two gestures (for play and finished) as means of expressive communication. The study was conducted at Viataal, the former Institute for the Deaf in Sint-Michielsgestel, in the Netherlands. Kris has been living in the Deaf-Blind Department of Viataal since he was 5 years old. He lives in a residential group with an integrated school and residential program, together with four other children who are deaf-blind. During school hours, he is taught by a single teacher, and after school hours, he is cared for by six caregivers. The teacher had only recently started to work in the Deaf-Blind Department. The six caregivers had been employed at the Deaf-Blind Department for 1 to 9 years.

Application of the intervention protocol

As soon as a need for interaction coaching was indicated, the interaction coach applied the intervention protocol outlined in Box 1 to design, implement, and evaluate an intervention. The application of the five-step protocol in the case of Kris is described next.

Determination of the question

After Kris became totally blind, he withdrew more and more and took fewer initiatives in interactions with his educators. The teacher found it difficult to interact with Kris in communicative situations and in self-help situations, such as dressing. Her request for interaction coaching was transferred to the interaction coach by the head of the residential group.

Clarification of the question

After the request for interaction coaching was made, the interaction coach consulted with the various educators to determine the definitive needs for interaction coaching, the relevant interaction situations, and the type of coaching. The interaction coach made an inventory of the questions in a team discussion with the professional partners (the teacher, caregiver, head of the living group, and psychologist). On the basis of the discussion, the coach formulated the teachers' needs as follows: (1) How can I encourage Kris to be more active during the calendar task and during dressing? (2) How can I stimulate the feelings of well-being in Kris? During the discussion with the professionals, the caregivers also indicated a need for interaction coaching. Because of organizational reasons, such as the fact that it would take a great deal of time to perform interaction coaching with all the team members, the interaction coach and the team of caregivers decided to provide individual coaching only to the teacher and to share the results of the coaching with the other educators after the intervention had been completed (see the Discussion section).

Interaction analysis

In the next step of the intervention protocol, the interaction coach analyzed videotapes of Kris and his teacher during the task of

dressing to translate the specific requests for coaching into a limited number of intervention aims in terms of the following eight core categories of interactive behavior described in Box 1 and the specific behaviors of Kris and his teacher that were observed in each category.

Initiatives

Initiatives are defined as starting an interaction or raising something new as part of a reaction. Kris initiated interactions by taking the hand of the teacher, leading the teacher by the hand, sitting on the teacher's lap, giving an object, taking an object of reference, and making a signal or a gesture. The teacher initiated interactions by bodily contact or other perceptible contact like hand-under-hand contact, blowing, and giving an object.

Confirmations

Confirmations are defined as clear acknowledgments that an initiative has been noticed and recognized. Kris confirmed by touching the tactile symbol without prompting by the teacher. The teacher confirmed by repeating the signal or touching the tactile symbol again.

Answers

Answers are defined as positive (approving) or negative (disapproving) reactions to an utterance of the interaction partner. Kris approved by giving an appropriate reaction and joining in an interaction game initiated by the teacher. Kris disapproved by withdrawing his hands, throwing away an object, and putting aside the no symbol. The teacher approved by granting the request. The teacher disapproved by repeating the utterance and explaining that the request could not be granted.

Turns

Turn taking is defined as becoming the actor, and *turn giving* is defined as allowing the other to become the actor. Kris took turns by searching for contact by reaching out his hand, taking an object, and rotating the object. The teacher took turns by putting her hands under Kris's hands, putting her hands on Kris's hands, and tactile prompting. Kris maintained turns by dressing and regulating intensity (defined later). Kris gave turns by giving an object and waiting and by tapping on a tactile symbol and waiting. The teacher gave turns by placing her hands on Kris's hands during tactile signing and keeping her hands available to Kris during contact.

Attention

Attention is defined as focusing on the interaction partner, the content of the interaction, and the people or objects within the context of interaction. Kris showed attention by reaching out with his hand, following the teacher's hands with his hands, and following the teacher's tactile initiatives. The teacher showed attention visually by visually localizing and turning her body toward Kris and tactilely by following with her hands on Kris's hands and holding her hands available to Kris.

Regulation of intensity

Regulation of intensity of the interaction is defined for the educator as waiting while the child who is deaf-blind guides the intensity of the interaction, and, for the child, as controlling the tension and tempo of the interaction as he processes the information he receives. An appropriate way to regulate intensity is to withdraw, such as turning one's head away, or some other cue, such as laying one's hand on the teacher's hand. An inappropriate method of regulating intensity includes self-abusive or aggressive behaviors. For Kris, appropriate regulatory

behaviors were head turning, twisting a tuft of hair, laying his hand on the teacher's hand, turning his head away, withdrawing his hands, and placing his hands on his neck. Inappropriate regulatory behaviors were pushing on his front tooth with his thumb nail, pinching his nose and forehead, pulling his hair, and pinching a partner.

Affective involvement

Affective involvement is defined as the mutual sharing of emotions. Kris showed positive emotions by making sounds of pleasure in combination with head turning and by smiling. He exhibited negative emotions by making sounds of displeasure in combination with head shaking or inappropriate behaviors to regulate the intensity of the interaction. The teacher showed affective involvement by repeating Kris's utterances in a perceptive way or by responding only in moments when it was not confusing for Kris.

Acting independently

Kris's independent acts in the dressing situation were putting a garment or part of a garment on alone, sitting or standing while dressing, and taking a garment or part of a garment out of the closet.

Along with the individual behaviors of Kris and the teacher in each of the eight categories, the interaction coach also described their *interaction characteristics* or interactional strengths and weaknesses. Strengths in the interaction were the motivation of both partners to make contact and the predictability of their routines, which made it possible for Kris to form a mental image of the activities. Kris's signals were difficult to recognize, and his active use of communicative aids needed to be improved. His negative reactions were subtle, making it easy for a partner to

ignore Kris's personal limits. The teacher needed to gain more insight into Kris's signals and acquire such skills as confirming and increasing affective involvement.

As part of the interaction analysis, the coach also examined which aspects of the *interactional context* should be adapted to improve the quality of interaction. She concluded that the teacher needed to adjust her communication methods to Kris's total blindness by, for example, giving instructions within arm's reach, changing her position in relation to Kris, adapting objects of reference, offering objects in an orderly way within his reach, and changing the place of furniture like the clothes closet. For the calendar task, Kris and his teacher sat opposite each other at the table and planned the day's activities by conversing with each other via tactile signing (hand-under-hand contact) and the use of objects of reference. During dressing, Kris and his teacher also sat opposite each other, so they could have hand-under-hand contact, and Kris sat next to the closet, so they could take out the clothing together. Finally, and based on the interaction analysis, the needs for coaching were translated into concrete *intervention aims*. The intervention aims--described in the left-hand column of Table 1--were focused primarily on making Kris more actively involved and enhancing his feelings of well-being in two situations.

Implementation of the intervention

After the interaction analysis was completed, the interaction coach started the intervention with the teacher and Kris. The intervention period lasted 15 weeks, and within these 15 weeks, 11 coaching sessions were held. A survey of the coaching sessions and a description of the content of the sessions is presented in Table 2 (for more information on the coaching process, see Van den Tillaart & Janssen, 2004). The intervention included 8 individual supervision sessions, which included coaching discussions and video analysis, and 2 sessions with

coaching and modeling in the workplace. In the final coaching session, after the intervention ended, the coach shared the results of the intervention with all caregivers of the residential group.

Evaluation

During the last coaching session, the interaction coach evaluated the results of the intervention with the teacher in terms of the intervention aims. Toward that end, the first videotaped segment that was recorded before the start of the coaching process was compared with the last videotaped segment that was recorded during the coaching process. The interaction coach also evaluated the teacher's satisfaction with the intervention process.

The teacher indicated that her original coaching questions were answered. She suggested that the team of caregivers should have additional interaction coaching because of a discrepancy in the insights and skills of the educators in the residential group. The caregivers were content with the information that was shared and did not want further team interaction coaching for organizational reasons that are further explained in the Discussion section.

Assessment of the effects of the intervention

Design

In an earlier study, the intervention effects of an intervention for Kris and his teacher were reported as part of the results of interventions across a sample of six children (Janssen et al., 2003a). In this section, we delve deeper into the individual results for Kris and his teacher.

Baseline, intervention, and follow-up observations were used to measure the effects of the intervention for Kris. A survey of the

weekly observations is presented in Table 3. The observations were carried out in both interaction situations that were chosen for intervention, namely, the calendar task and the dressing task. Three follow-up observations were made after two, five, and eight months to examine whether possible intervention effects would be maintained.

Observation and reliability

For each observation, a five-minute episode of interaction was recorded on videotape. The frequency and duration of the various target behaviors were registered using an observation form that was designed for this purpose. The observations and scoring were carried out by the first author and two research assistants. Prior to formal data collection, the observers were trained to 80% interobserver agreement for all the categories, with the exception of affective involvement (interobserver agreement could not be calculated for this category because the behaviors occurred too infrequently on the training tapes). Interobserver reliability was computed for 25% of the videotaped episodes and was found to range from 86% to 100% in the two situations, with a grand mean of 92.6% across all the categories, with the exception of affective involvement.

Results

The results for Kris are presented in relation to the aims of the intervention. As was shown in Table 1, the first aim--*more active involvement* during the calendar task--was translated in terms of the interaction categories of initiatives, confirmations, and turn taking. The figures for Kris in the calendar task (see Table 4) show a change in the desired direction for all the target behaviors. During the intervention, the teacher initiated less often and confirmed more, and her turns became shorter. Kris initiated and confirmed more often, and his turns became longer. During the

eight-month follow-up period, the levels of several categories (the teacher's initiatives and turn taking and Kris's initiatives and confirmation) were found to decline, but nevertheless remained above the baseline. Figure 1 provides a quick visual comparison of the effects of the intervention in relation to the first aim. The figure depicts the mean occurrence of the target categories of behavior that were related to the first aim across the baseline, intervention, and follow-up periods.

The second aim of the intervention--*more active involvement during dressing*--was translated into the interaction categories of initiatives, confirmations, answering approvingly, and acting independently (see Table 1). For the dressing situation, positive intervention effects were found for all the target categories during the intervention (see Table 4 and Figure 2). For two of the target behaviors (initiatives and confirmations by the teacher), the intervention effects diminished during the follow-up, and for one behavior (initiatives by Kris) the intervention effect disappeared completely during the follow-up. For the other target behaviors (answering approvingly by Kris and the teacher and acting independently by Kris), however, the follow-up scores remained at the same level or even improved over those for the intervention.

The third aim--*more feelings of well-being during the calendar task and dressing*--was translated into the interaction categories of intensity and affective involvement. During the intervention, the regulation of intensity by the teacher and by Kris improved in the desired directions (see Table 4 and Figure 3 and Figure 4). For the regulation of intensity by the teacher for the calendar task, the effect of intervention disappeared during the follow-up. In contrast, for Kris, the follow-up scores for the regulation of intensity in both situations remained at the same level or even improved over those for the intervention level. The dyadic category of affective involvement also showed considerable

improvement during the follow-up in both situations.

The social validity of the intervention was assessed using 5-point rating scales, from 1 (the lowest) to 5 (the highest).The teacher rated the different types of coaching as very positive (5). Various elements of the coaching plan--recognizing the individual signals, tactile communication and hand-under-hand contact, turn taking and turn giving, and sharing emotions--were rated as easy to implement (3). One element of the coaching plan--coping with inappropriate regulation of intensity--was rated as "difficult" (2).

Discussion

The Diagnostic Intervention Model is useful for different types of interaction coaching: individual coaching, team coaching, and team coaching with additional individual coaching. In the case of Kris, individual coaching of the teacher was chosen. The caregivers indicated a need for interaction coaching, too, but for organizational reasons, team coaching could not be provided. The team received one session with a transfer of information. As the results indicated, the intervention with individual coaching of the teacher and the transfer of the main intervention principles to the team at the end of the intervention were effective. Both Kris and his teacher benefited from the intervention. The well-being of Kris increased even in the long term. In spite of these positive effects, there are several reasons why it might have been better to involve the other team members more intensely in interaction coaching in the case of Kris. At the end of the coaching process, Kris's teacher said that she regretted that her novel experiences were not shared by the other team members. The lack of team coaching may have been frustrating to the other team members as well. In addition, the intervention would have been more effective if all the team members had been interacting in the same way, which is especially critical in a situation like dressing, which, of course, occurs in many situations other than with the teacher. In

two later cases (Anton and Nicole), we successfully combined team coaching with individual coaching (Janssen et al., 2002).

The intervention model is also applicable in home situations. In the case of Kris, the interaction coach did not choose to coach in the home setting because the request for coaching concerned Kris's functioning in the residential setting. Before the start of the intervention, Kris's parents were informed of the most important intervention principles and agreed that only the teacher would receive coaching. They observed the implementation of the intervention principles for Kris and his teacher every Monday morning when they brought Kris to school.

It is important for managers, team leaders, and interaction coaches to know how much time interaction coaching requires for a given case. In the case of Kris, which was one of the first cases treated using the Diagnostic Intervention Model, a relatively intensive coaching period was required. In this case, the interaction coach spent 23 hours in total--10 hours of preparation, 8 hours of individual coaching through instruction and video analysis, 2 hours of modeling and coaching on the job, and 3 hours for evaluation and sharing the results with the team (see also Table 3). In other cases, effective interaction coaching was less time-consuming; 14 hours per case was the minimum time required for effective intervention. In the case of Kris, coaching was intensive, but proved to be effective in the long term; most intervention effects were maintained for 2, 5, and 8 months. That is, the teacher succeeded in independently executing the newly learned skills without interaction coaching for a long period of time.

Conclusions and implications for practice

In this article, we demonstrated how to apply the Diagnostic

Intervention Model in an individual case study. In the case of Kris, positive intervention effects were attained, and these positive effects were maintained for all but one of the target behaviors across a follow-up period of eight months. Furthermore, the intervention gains even increased during the follow-up for some of the target behaviors, such as affective involvement.

In an earlier study, the Diagnostic Intervention Model was shown to be effective in fostering harmonious interactions for six deaf-blind children with various educators and in various settings (Janssen et al., 2003a). In that study, the effects of interventions based on the model were evaluated across cases. In this article, we have elaborated on one of the cases included in the former study--the case of Kris--to provide a more extensive description of the application of the model. In this section, we point out some general implications of the study for everyday practice and for maintaining high-quality interaction coaching in the long term.

It is important for interaction coaches to be available on request and in a timely manner for needed practice sessions. Interaction coaches must be highly qualified. The Deaf-Blind Department at Via-taal in Sint-Michielsgestel has a certified trainer for interaction coaches and special courses for interaction coaches and interaction partners of individuals who are deaf-blind. The courses were developed by Van den Tillaart (1998, 2000, 2001; Van den Tillaart & Janssen, 2004) and were implemented for practice by Martens and colleagues at Viataal (Martens & Janssen, 2003; Martens, Janssen, & Van den Tillaart, 2003; Martens, Van de Ven, & Janssen, 2003).

It should be noted that interaction coaching is not a separate profession, but can be added to the skills of various professionals who are already working in the field of deaf-blindness. Interaction coaches can, for example, be speech therapists, trained caregivers

or teachers, internal consultants, case managers, or special educators. At the Deaf-Blind Department at Viataal in Sint-Michielsgestel, there are seven interaction coaches. These coaches completed the basic course that was designed to prepare professionals to work with persons who are deaf-blind. In the basic course, the same terminology is used to describe interaction with persons who are deaf-blind that is used in the sessions for interaction coaching. The core categories of interaction that are used in the Diagnostic Intervention Model are also included in this conceptual framework. After the basic course, the interaction coaches receive specialized training for 1.5 years by a certified trainer. This training consists of three phases. In the first phase, the participants gain insight into their skills in establishing harmonious interactions with different persons who are deaf-blind and learn to analyze video segments and to apply the appropriate terminology to the segments. In the second phase, the participants learn how to coach interaction partners using video segments. In the third phase, they learn how to implement the skills in which they have been trained in different cases with continuous feedback from the trainer.

The trainer is experienced in the education of students who are deaf-blind and is educated by an association that specializes in video interaction guidance (associative intensive training in home situations, or AIT). The education to become a trainer takes 1.5 years, during which the trainer learns how to support interaction coaches by microanalyzing videotaped interaction episodes, trains four interaction coaches, and receives individual feedback on his or her coaching skills by an AIT trainer. More information on the courses for deaf-blind-specific interaction coach and interaction trainer is available at the Centrum voor Expertise at Viataal in Sint-Michielsgestel and from the first author. In the United States, Craig Axelrod and colleagues, at the Texas School for the Blind and Visually Impaired, used the principles of the Diagnostic Intervention Model and of the interaction study of Rick van Dijk

to set up a specific training course for staff who are teaching students with deaf-blindness (Axelrod, 2004, 2005; Martens & Janssen, 2003; Van den Tillaart & Janssen, 2004; Vervloed, van Dijk, Knoors, & van Dijk, in press).

For the effective implementation of interaction coaching, it is essential that the coaching be part of an organization's structure, and interaction coaching must be supported by the director and managers of an organization. As for the team members who work with a student who is deaf-blind (the caregivers, teachers, classroom assistants, and parents), the person who is responsible for the team (the "treatment coordinator") has to evaluate the student's need for the interaction and coaching and select relevant coaching needs. The treatment coordinator needs to be consulted to determine the type of coaching and to plan the coaching process. When the treatment coordinator is knowledgeable, she or he can evaluate the effects of the interaction coaching together with the interaction coach and adjust the timing of the coaching process, if necessary. Finally, the treatment coordinator should decide when the intervention goals are reached and the relevant needs have been met, thereby completing the diagnostic intervention cycle.

The Diagnostic Intervention Model has been used in practice with other groups of people with disabilities and where the staff is not specifically qualified. These settings have included those for persons who are intellectually disabled, adults who are visually impaired, and one for adults who are deaf-blind (Martens & Van den Burg, 2005; Menke & Zondervan, 2005). Although these interventions seem to have been successful, scientific research is necessary to prove the effectiveness of the model or adaptations of the model with these different target groups in different settings.

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