Socio-Communicative Variables and Behavior States in Students with Profound and Multiple Disabilities: Descriptive Data from School Settings

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Abstract: Assessment of student behavior states and contextual variables has emerged as a promising area for research and practice in the education of individuals with profound and multiple disabilities. This paper presents findings of an observational study of ten school-aged students in this population, with particular attention being paid to social and communicative variables operating in educational settings. Comparisons are made with other published studies of behavior state assessment and socio-communicative processes observed in special education programs. Implications of these findings are discussed in relation to extant literature and avenues for further investigation in this field.

In light of a range of evidence from research and the field, several authors have suggested that existing best practices in the area of severe disability appear to be largely inappropriate for individuals with profound and multiple disabilities (Ferguson, 1985; Guess et al., 1991; Sailor, Gee, Goetz, & Graham, 1988; Thompson & Guess, 1989). It is clearly important then that further effort is directed toward the identification of strategies and approaches which are relevant to student needs and that maximise the learning, involvement and self-determination of this population (Brown, Gothelf, Guess, & Lehr, 1998). In this context, Thompson and Guess interviewed a small sample of teachers working with students with profound disabilities. These practitioners discussed a wide range of issues relating to the education of their students, including strategies they reported to be effective in improving student participation and involvement in educational programs. One particularly important theme raised by these teachers, and supported by Guess (1989), relates to the balance between teacher and student directedness in daily programs, and the potential for enhancing student involvement if attention is paid to this aspect of instructional programming.

In contrast to a traditional model of skills acquisition, in which roles of trainer and learner are clearly delineated, the need to set goals from the perspective of the student, to become attuned to experiences of the student and move with the student, rather than superimposing a behavioural target for performance, becomes a central strategy (Brown et al., 1998; Guess, 1989; Shaddock, 1994; Thompson & Guess, 1989). Such an approach will have implications for the improvement of individual levels of awareness and alertness, communicative involvement and partner sensitivity to and understanding of personal needs, including the impact of medically fragile conditions and physical disabilities for individuals across the day and across the lifespan (Thompson & Guess). In essence, a new curriculum approach for students in this population is needed in which the role of the human ecology in learning is emphasized, predicated on the fundamental elements of human dignity and quality of life (Shaddock).

During the past decade, behavior state assessment has emerged as an approach that can assist teachers and others in better identifying and understanding student alerting and engaging behaviors (Ault, Guy, Guess, Bashinski, & Roberts, 1995; Richards & Rich-
Research into state profiles and sequences (for example, Guess et al., 1993a; Guess, Roberts, Siegel-Causey, & Rues, 1995), the relationship of behavior states and environmental events (Guess et al., 1993a; Richards & Sternberg, 1992) and the study of changes in behavior states when independent variables are introduced (Ault et al.; Reese, 1997) has provided an impressive body of knowledge in this area.

This paper seeks to contribute to this literature by providing descriptive data on the behavior states and educational experiences of ten students with profound and multiple disabilities who were observed as they attended special schools in NSW, Australia. A particular goal is the dissemination of detailed findings about the communicative activity observed in learning situations for this population, as an extension to the work of Guess and others over the past two decades. The study by Houghton, Bronicki, and Guess (1987) will be a specific point of comparison in relation to the presence (or absence) of cueing and responding behaviors by staff and students in classrooms. In a recent paper, two conceptual models were introduced to highlight several points which guided the investigation reported here, including selection and definition of observational variables and potential linkages amongst them (Arthur, 2002). First, the individual can be considered in terms of their interactions with a range of variables, which become increasingly complex, moving from direct and personal socio-communicative experiences to a potentially diverse range of settings in which such interactions may take place. Second, in many instances, individual and contextual factors mutually interact and affect change in each other (Arthur).

From a heuristic and empirical viewpoint, there are several arguments for collection and analysis of this type of information. The first such argument is the need for more basic, descriptive data on behavior states in this population. Identification of practical and reliable ways of assessing behavior states of a person, in their educational situation, serves to contribute to an improved understanding of the life experiences of individuals with such complex needs (Richards & Richards, 1997). Next, the provision of empirical findings relating to social and communicative phenomena in educational settings will provide a sound basis for design of specific intervention studies. For example, it may be helpful to explore the influence of particular external factors such as partner cueing behaviors on student states and conversely, impact of such states on the environment of the student, in order to inform the identification of strategies that will promote improved levels of involvement and alertness (Ault et al., 1995; Guess et al., 1993c). First, however, it is important to have detailed naturalistic information about these variables from a range of sources.

The following research questions, therefore, guided the investigation reported in this paper: 1. What behavior states and communicative behaviours are demonstrated by a sample of ten school-aged students with profound and multiple disabilities? 2. What is the nature of the contextual events and conditions experienced by students with profound and multiple disabilities in segregated educational settings in Australia?

**Method**

**Overview**

This study was conducted in four related phases, described in detail elsewhere (Arthur, 1998). The first of these was a pilot phase involving field trials carried out over several years in order to refine observational codes for behavior states and contextual factors, aspects of inter-observer agreement and procedures to be followed in data collection. In the second minor validation phase, a package containing a small sample of video footage, the observational codes and a series of instructions was sent to three professionals with significant experience working with individuals with the most severe and multiple disabilities. Codes were then refined by the researcher on the basis of feedback from these experts and an analysis of points of disagreement. A second viewing by the three professionals, using the adapted codes was then carried out.

Next, students who were judged to be in the target group for the study were identified (phase 3). A series of researcher visits to participating classrooms was made in an effort to desensitise staff and students to the presence of the observers during the formal observa-
tional periods. In addition, these orientation visits provided the opportunity for further field-testing of data collection procedures and a final check of inter-observer agreement levels. This exercise was followed by the fourth and final phase in which ten school-aged students with the most severe and multiple disabilities, drawn from classes in several segregated, special purpose schools were observed continuously for an entire day. Behavior state and contextual data were collected, along with random inter-observer agreement checks and relevant demographic, educational and medical information about each student. This phase is now described in detail.

Research Design

A multiple case study design was used in order to collect detailed observational information about the behavior states and communicative activities of ten school-aged individuals with the most severe and multiple disabilities, and a range of contextual events and conditions relevant to this population. By recording several events and conditions simultaneously the researcher was able to embed the analysis of complex phenomenon pertaining to each participant (Yin, 1984).

Participants

Students. Ten students, ranging in age from four to eighteen years, were selected for observation, comprising four males and six females. All students had been educationally classified in the range of severe intellectual disability according to governmental placement guidelines and AAMD criteria (Grossman, 1983; NSW Department of School Education, 1996). Several steps were followed in the process of identifying suitable participants. First, a number of teachers working in local special schools were asked to nominate students in their programs who were considered to have the most severe and multiple disabilities. Next, informal observations of these students were made by the author and an experienced research assistant who had been involved in the earlier phases of the study.

Finally, the classroom teacher and the researchers independently rated each student against criteria based on those developed and utilised by Guess and his colleagues (1991, 1993a). The criteria were a) severe motoric difficulties, b) apparent lack of involvement with the environment, c) non-verbal, d) sensory loss, and e) dependence on others to meet basic daily needs. Students were included in the final phase of the study if there was 80% concurrence between the researchers and the teacher on these five criteria, and appropriate parental/primary caregiver consents to participation were obtained. Individual participant characteristics are provided in Table 1. It should be noted that the collection of this data was limited to class and school records and therefore some aspects may be incomplete.

Teachers, aides, peers and others. A range of staff members, student peers and others working or participating in the class programs (for example, volunteer aides assisting with hydrotherapy programs) were observed during the course of the study, when appropriate consents had been obtained. Although no specific background information was collected, the designated role of communication partners for observed students (e.g., teacher, aide, peer) was noted.

Settings

All students who participated were enrolled in segregated special schools operated by a government authority, the NSW Department of School Education. These schools provide educational programs for students with moderate to severe intellectual disability, many of whom also have sensory and/or physical impairments. Students and staff in four classes, spread across three special schools, took part in the major data collection phase of the study. The naturalistic, non-intrusive focus of the investigation meant that students were observed in each and every setting in which programs were delivered. Like other studies in this area, the majority of observations were carried out in classrooms. However, in many instances, students were also followed into different settings including the school playground and the community.
Instrumentation

Four instruments were used in the main data collection activity of the study, after development in earlier phases (Arthur, 1998). First, the Daily Observational Grid provided a means of recording detailed information about student behavior states and aspects of their educational context, including setting, based on the ten-second interval procedure employed in the observational schedule. Next, a brief summary form was designed to allow the researchers to record pertinent information about each student, including scores on developmental, psychometric or adaptive assessments, medical conditions and adaptations, and sensory or motor impairments. This data is provided in Table 1.

Behavior states. Nine behavior state codes and definitions (excluding seizures), disseminated elsewhere (Arthur, 1998; Arthur, Foreman, Pascoe, Butterfield, & Bennett, 1999), were developed through a process of pilot and field trials and a minor validation, reflecting several minor adaptations to the work of Guess et al. (1991, 1993a). The details for each code are provided in Appendix 1.

Contextual variables. Like the behavior state codes and definitions, a series of contextual factors were identified and defined over a period of several years, in an effort to reflect the reality of typical classrooms serving the target population. Main areas of focus were communication indicators, communication partner, activity, position, an index of social grouping and the broad setting for the observation (Arthur, 1998; Arthur et al., 1999). These variables are fully described and defined in Appendix 2 and have been integrated into two conceptual schema in a recent paper (Arthur, 2002). The focus upon social and communicative aspects is consistent with relevant empirical literature, which indicates a need for further collection of data about the nature of the relationship between student states and factors in the human ecology of schools and classrooms (see, for example, Guess et al., 1991; Richards & Richards, 1997).

It is appropriate to consider one contextual variable in more detail. Four codes were developed as ‘Communication indicators’: 1. Communicative interaction, 2. Student communicative cue: No partner response, 3. Partner communicative cue: No student response and 4. No communication. Based on the work of researchers such as Houghton et al. (1987) and Rowland (1990), the purpose of data collection for this variable was the identification of broad patterns of communicative or non-communicative activity in naturalistic situations, simultaneously to the study of the other defined factors such as behavior state, communication partner and activity.

Procedure

The schedule of data collection sessions was based on researcher and class availability. When more than one student in a class was selected to participate, student names were randomly chosen to determine order of observation. For each of the ten students, observational information was gathered for one entire day, commencing at approximately 9.30am and concluding at approximately 2.30pm. In several instances, data was collected for a little under five hours due to the early departure of students in group travel arrangements.

The five hours available for observation were divided into sixty five-minute periods, with each allocated an observational number from one to sixty. Each five-minute period was subdivided into fifteen twenty-second intervals. Sixty copies of the Daily Observational Grid, designed to record data for five minutes, were prepared and numbered in the sequence one to sixty, with additional information such as the observer and student number and school also noted prior to the observational session. The grid is made up of fifteen lines of codes, representing the various observational categories, numbered from interval one to interval fifteen. Recording materials involved were the numbered sheets, a pen and a clipboard, along with a cassette player and personal headphones. Each observer was scheduled for three consecutive five-minute sessions, after which he/she was replaced by the other observer. During rest periods, observers were in close proximity to the active coder in order to facilitate smooth transitions, and were also randomly scheduled for interobserver agreement checks.

Following the behavior state and contextual codes identified earlier (Appendices 1 and 2),
### TABLE 1

<table>
<thead>
<tr>
<th>Participant Characteristics</th>
<th>Developmental and adaptive assessments</th>
<th>Medical conditions</th>
<th>Medications and dosage levels</th>
<th>Sensory impairments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student</strong></td>
<td><strong>Gender</strong></td>
<td><strong>Age</strong></td>
<td><strong>School</strong></td>
<td><strong>Educational classification</strong></td>
</tr>
<tr>
<td>1</td>
<td>Male</td>
<td>17</td>
<td>A</td>
<td>IS</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>10</td>
<td>B</td>
<td>IS</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
<td>6</td>
<td>B</td>
<td>IS</td>
</tr>
<tr>
<td>4</td>
<td>Female</td>
<td>10</td>
<td>A</td>
<td>IS</td>
</tr>
<tr>
<td>5</td>
<td>Female</td>
<td>18</td>
<td>A</td>
<td>IS</td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>18</td>
<td>A</td>
<td>IS</td>
</tr>
</tbody>
</table>

**Notes:**
- H.E.L.P.: Hospital for Epilepsy, Learning and Physical Disorders (University of Hawaii)
observers were required to observe the target student and their environment for a continuous period of ten seconds and then record a judgment about each category on the Daily Observational Grid in the following ten seconds, by circling the appropriate descriptor. The predominant condition in each area was noted, with the exception of ‘Communication indicators’, in which a decision rule was implemented relating to the presence of at least one cueing event in an interval (Appendix 2). In addition, setting changes were recorded by marking variations at the exact ten-second-interval line on the grid.

Observer training and inter-observer agreement checks. Three observers collected data in the final phase of the investigation, after a program of training that included the use of videotapes, discussions and the attainment of an 80% agreement criterion for each code in a series of field trials. Inclusive of the earlier phases of the study, a total of seven observers were involved in various aspects of code development and data collection (Arthur, 1998). Prior to commencement of each period of observations, a schedule of inter-observer checks was organised for fifteen (25%) of the five-minute observations, spread randomly across the day. Both observers scored the various codes simultaneously and independently, having watched the target student and contextual conditions at exactly the same time.

Inter-observer agreement levels for behavior state and contextual variables. Table 2 presents grand means for the inter-observer checks conducted on a random 25% of observations for each student, across the defined variables reported. Ranges for daily means on each variable across the ten participants are also noted. Grand mean was calculated by totaling means for each student and dividing by the number of students (n = 10). In addition, kappa coefficients for each of the variables were calculated in order to examine the effect of correcting for expected chance agreements in each observational category, as a function of the number of values in each (Bakeman & Gottman, 1986; Cohen, 1960, 1968; Siegel & Castellan, 1988). Due to a procedural error, inter-observer data for settings was not collected for students 1 and 2. Accordingly, a kappa coefficient for settings is not reported as inter-observer scores for this variable were computed.
on data collected for students 3-10, precluding comparison with other coefficients, which were based on the entire sample (n = 10).

A further check of reliability estimates was made for data collected on two students, using a code-recode procedure involving comparisons between live and video coding of behavior states and contextual conditions. These levels of agreement, especially variations in state-by-state coefficients, have been discussed in detail elsewhere (Arthur, 1998, 2000).

Data entry and analysis. Observational information collected in the final phase of the investigation was entered as ASCII text files, following the codes described earlier. At the conclusion of one entire data entry, the data set was re-entered. Visual inspections and a tailored software program were utilised to identify and correct key-punch errors, in an effort to enhance the internal validity of the final data set, in preparation for the use of descriptive and other statistical analysis techniques (Arthur, 1998).

Results

In Tables 3-6, basic interval percentages for observational variables are reported for each student. In addition, means for observational categories across the sample are noted, although emphasis in this section is upon individual differences in terms of the defined codes used in the study.

Behavior States

Data presented in Table 3 demonstrates individual differences in behavior state profiles of the ten students observed in this phase of the study. Several points relating to individual and group patterns for behavior state codes should be noted. First, presence of the asleep-inactive state is strongly differentiated across the group, ranging from zero incidence to just over half of the school day for one individual (Student 8). In contrast, both the asleep-active and drowsy states occur within a smaller range at the lower end of the interval percentages. Interestingly, all of the students (with the exception of Enya, Student 7) were observed to be drowsy for some proportion of the day. Second, the daze state occurred in a small proportion of the observations made of each student. Alison, (Student 9) demonstrated the highest level of this state amongst the study participants (11.8%). Third, the combined percentages for the awake-inactive-alert and awake-active-alert states represent, in each case, a large proportion of the observational period. Six students (2, 3, 4, 5, 6, 10) spent over 50% of their day in either of these two states, generally considered to be optimal for interaction and engagement. In contrast, the awake-active-self stimulatory state was observed in five students, with two participants (Students 1, 7) spending just under half of the day in this condition. The awake-active-self injury state was not observed as the predominant condition in any of the participating students. Finally, Table 3 indicates that crying

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**TABLE 2**

Grand Means, Cohen's Kappa Coefficients and Daily Mean Ranges for Inter-observer Agreement across Observational Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Grand Mean (%)</th>
<th>Range (%)</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior states</td>
<td>83.17</td>
<td>75.99–92.88</td>
<td>.77</td>
</tr>
<tr>
<td>Communication indicators</td>
<td>88.92</td>
<td>82.21–95.23</td>
<td>.71</td>
</tr>
<tr>
<td>Communication partner</td>
<td>94.86</td>
<td>87.10–97.77</td>
<td>.81</td>
</tr>
<tr>
<td>Activity</td>
<td>96.04</td>
<td>90.22–100.00</td>
<td>.93</td>
</tr>
<tr>
<td>Position</td>
<td>97.86</td>
<td>92.88–100.00</td>
<td>.95</td>
</tr>
<tr>
<td>Social</td>
<td>92.56</td>
<td>87.55–98.57</td>
<td>.89</td>
</tr>
<tr>
<td>Setting&lt;sup&gt;a&lt;/sup&gt;</td>
<td>98.27</td>
<td>86.66–100.00</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Inter-observer agreement on setting was calculated for students 3–10 as a procedural error resulted in missing inter-observer information for students 1 and 2 on this variable.
TABLE 3
Percentage of Observed Intervals for Behavior States and Communication Indicators: Ten Case Studies**

<table>
<thead>
<tr>
<th>Student</th>
<th>Asleep-Inactive</th>
<th>Asleep-Active</th>
<th>Drowsy</th>
<th>Daze</th>
<th>Awake-Inactive</th>
<th>Awake-Active</th>
<th>Awake-Active Self Stimulatory</th>
<th>Awake-Active Self Injury</th>
<th>Crying</th>
<th>Seizures</th>
<th>Communicative interaction</th>
<th>Student cue</th>
<th>Partner cue</th>
<th>No communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evan</td>
<td>15.9</td>
<td>5.9</td>
<td>3.9</td>
<td>0.3</td>
<td>12.5</td>
<td>13.7</td>
<td>47.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>5.4</td>
<td>36.1</td>
<td>1.4</td>
<td>57.0</td>
</tr>
<tr>
<td>2. Nigel</td>
<td>0.0</td>
<td>0.0</td>
<td>3.8</td>
<td>0.1</td>
<td>73.4</td>
<td>22.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>3.8</td>
<td>6.4</td>
<td>5.7</td>
<td>84.1</td>
</tr>
<tr>
<td>3. Anne</td>
<td>0.0</td>
<td>0.0</td>
<td>8.2</td>
<td>1.9</td>
<td>52.1</td>
<td>25.3</td>
<td>0.0</td>
<td>0.0</td>
<td>12.0</td>
<td>0.0</td>
<td>7.3</td>
<td>19.0</td>
<td>2.3</td>
<td>70.9</td>
</tr>
<tr>
<td>4. Elise</td>
<td>0.0</td>
<td>0.0</td>
<td>11.0</td>
<td>2.1</td>
<td>54.0</td>
<td>32.9</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>9.7</td>
<td>9.5</td>
<td>9.0</td>
<td>71.5</td>
</tr>
<tr>
<td>5. Elyssa</td>
<td>0.5</td>
<td>0.8</td>
<td>9.2</td>
<td>1.8</td>
<td>58.8</td>
<td>11.4</td>
<td>17.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.7</td>
<td>21.6</td>
<td>5.3</td>
<td>70.8</td>
</tr>
<tr>
<td>6. Wayne</td>
<td>0.0</td>
<td>1.4</td>
<td>6.4</td>
<td>3.9</td>
<td>62.6</td>
<td>24.9</td>
<td>0.0</td>
<td>0.0</td>
<td>0.3</td>
<td>0.1</td>
<td>9.1</td>
<td>10.7</td>
<td>6.0</td>
<td>74.0</td>
</tr>
<tr>
<td>7. Enya</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>4.4</td>
<td>27.6</td>
<td>21.8</td>
<td>45.0</td>
<td>0.0</td>
<td>3.1</td>
<td>0.0</td>
<td>4.1</td>
<td>18.8</td>
<td>3.0</td>
<td>74.1</td>
</tr>
<tr>
<td>8. Liam</td>
<td>52.4</td>
<td>3.3</td>
<td>7.2</td>
<td>0.3</td>
<td>24.4</td>
<td>9.3</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.9</td>
<td>0.9</td>
<td>2.2</td>
<td>8.2</td>
<td>88.7</td>
</tr>
<tr>
<td>9. Alison</td>
<td>27.2</td>
<td>9.4</td>
<td>10.3</td>
<td>11.8</td>
<td>18.0</td>
<td>21.8</td>
<td>0.3</td>
<td>0.0</td>
<td>0.6</td>
<td>0.6</td>
<td>1.8</td>
<td>7.3</td>
<td>7.6</td>
<td>83.1</td>
</tr>
<tr>
<td>10. Yanti</td>
<td>30.7</td>
<td>9.2</td>
<td>6.3</td>
<td>1.0</td>
<td>22.8</td>
<td>27.5</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>2.5</td>
<td>3.4</td>
<td>2.7</td>
<td>7.5</td>
<td>86.4</td>
</tr>
</tbody>
</table>

Mean 12.6 3.0 6.6 2.7 40.6 21.1 11.0 0.0 1.6 0.4 4.7 13.4 5.6 76.0

*a Actual percentages are reported, thus rows which include missing cases do not total 100%.

b Superscript numerals (1–5) indicate the total number of missing cases for that student and variable.
and seizures occurred for several students in very small proportions of the entire day, with the exception of Anne, Student 3, who spent 12% of the observational period in the crying state.

Communication Indicators

Information on communication indicators presented in Table 3 appears to be relatively consistent across case studies. First, communicative interactions were judged to occur in the range 0.9-9.7% of intervals observed across students. A similar range in single figure percentages (1.4-9.0%) serves to describe the level of partner cues. Student cues, in contrast, were distributed more widely across students, with Students 1, 3, 5, and 7 demonstrating higher levels of this communicative behavior than the remaining participants. Finally, the proportion of ‘no communication’ was uniformly high, with nine of ten participants and situations judged to be in this condition for 70% or more of intervals.

Communication Partners

As Table 4 indicates, teacher aides were the most commonly observed communication partners, with teachers, peers and others (such as volunteers and speech pathologists) represented in very small proportions. The generally high incidence of ‘no partner’ is a function of the decision rule to score this code when ‘no communication’ was observed (Appendix 2). Tables 3 and 4 highlight the large number of observational intervals, consistent across students, during which no communication behavior or partner was noted.

Activity

Domains of independent living and leisure accounted for the largest amounts of time in activity for students, countered only by significant proportions of the school day in the condition of ‘no activity’. The range demonstrated for independent living across students was considerable (6.4 - 30.3%), with an even larger span of occurrence scores in the leisure area (1.9 - 50.4%). With the exception of Liam (Student 8), minimal time was committed to movement/transition for students, a finding which was also true for therapy related activities, when they did take place. In five cases, no therapy related activities were observed during the day of observation. Vocational activities involving participating students also were not observed.

Student Positioning

As indicated in Table 5, seated was the predominant position observed in nine of ten case studies. Five students demonstrated standing, with Elise (Student 4) in this position for almost one quarter of the day in total. Prone and supine positions were observed in generally low proportions, with some exceptions, whilst the side-lying position occurred in seven case studies, across a wide range of scores (0.8 - 52.3%). Repositioning took place for all students, at consistently low levels.

Social Grouping

The four descriptors in Table 5 (solitary, close proximity, small group and large group) provide evidence of wide-ranging scores across students, suggesting that there are no clearly identifiable or consistent patterns in this area of analysis.

Setting

Data reported in Table 6 reflect a range of individual differences between participants in relation to the number and types of settings experienced. A number of individuals (students 2, 3, 5, 6, 7, 9, 10) spent the majority of the observed day in the classroom, with some time in the playground or other situations. Student 1, in contrast, remained in the school playground for the entire day. Student 4 was observed in the playground for a large part of the day, in addition to time in the classroom and a small period in the bus. Finally, Student 8 appeared to function in a wide range of settings, with a large amount of time spent in the community on the day observations were conducted.

Discussion

Tables 1-6 have provided background information and the results of a multi-phase study
### TABLE 4
Percentage of Observed Intervals for Communication Partners and Activity: Ten Case Studies^ab

<table>
<thead>
<tr>
<th>Student</th>
<th>No partner</th>
<th>Teacher</th>
<th>Aide</th>
<th>Peer</th>
<th>Other</th>
<th>Independent</th>
<th>Leisure</th>
<th>Vocational</th>
<th>Conceptual</th>
<th>Movement/Transition</th>
<th>Therapy related</th>
<th>No activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evan</td>
<td>83.3</td>
<td>0.0</td>
<td>14.0</td>
<td>0.8</td>
<td>1.7^1</td>
<td>14.6</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.3</td>
<td>0.0</td>
<td>84.0^1</td>
</tr>
<tr>
<td>2. Nigel</td>
<td>88.6</td>
<td>2.1</td>
<td>9.1</td>
<td>0.1</td>
<td>0.1</td>
<td>9.3</td>
<td>11.9</td>
<td>0.0</td>
<td>1.9</td>
<td>2.4</td>
<td>6.2</td>
<td>68.2</td>
</tr>
<tr>
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<td>8.2</td>
<td>7.4</td>
<td>0.1</td>
<td>2.8^4</td>
<td>30.3</td>
<td>18.4</td>
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<td>0.0</td>
<td>2.7</td>
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</tr>
<tr>
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<td>0.1</td>
<td>19.3</td>
<td>0.1</td>
<td>0.6^2</td>
<td>18.0</td>
<td>21.8</td>
<td>0.0</td>
<td>0.0</td>
<td>1.6</td>
<td>0.0</td>
<td>58.5^1</td>
</tr>
<tr>
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<td>0.9</td>
<td>15.5</td>
<td>1.0</td>
<td>0.2^5</td>
<td>21.2</td>
<td>37.5</td>
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<td>0.0</td>
<td>1.4</td>
<td>0.0</td>
<td>39.9</td>
</tr>
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<td>0.4^3</td>
<td>10.3</td>
<td>50.4</td>
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<td>1.3</td>
<td>1.0</td>
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</tr>
<tr>
<td>7. Enya</td>
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<td>2.3</td>
<td>0.3</td>
<td>21.3</td>
<td>25.9</td>
<td>0.0</td>
<td>0.7</td>
<td>3.3</td>
<td>1.7</td>
<td>47.1</td>
</tr>
<tr>
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<td>0.3</td>
<td>0.1</td>
<td>19.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>23.2</td>
<td>0.0</td>
<td>57.0^1</td>
</tr>
<tr>
<td>9. Alison</td>
<td>90.0</td>
<td>8.4</td>
<td>1.3</td>
<td>0.0</td>
<td>0.0^6</td>
<td>7.3</td>
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<td>0.0</td>
<td>1.3</td>
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<td>86.0^2</td>
</tr>
<tr>
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<td>0.6</td>
<td>6.4</td>
<td>11.5</td>
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<td>0.0</td>
<td>2.0</td>
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</tr>
<tr>
<td>Mean</td>
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<td>11.1</td>
<td>0.9</td>
<td>0.6</td>
<td>15.8</td>
<td>17.9</td>
<td>0.0</td>
<td>0.2</td>
<td>4.0</td>
<td>1.8</td>
<td>59.9</td>
</tr>
</tbody>
</table>

^a Actual percentages are reported, thus rows which include missing cases do not total 100%.

^b Superscript numerals (1–5) indicate the total number of missing cases for that student and variable.
which investigated the behavior states of students with profound and multiple disabilities, along with contextual conditions observed in a small number of educational programs supporting these individuals. Following a brief discussion of methodological issues in relation to the validity and reliability of the study, the reported data will be compared with other findings in the research literature.

**Issues in Reliability and Validity**

A number of measures were undertaken in the study in relation to issues of reliability and

---

**TABLE 5**

<table>
<thead>
<tr>
<th>Student</th>
<th>Seated</th>
<th>Standing</th>
<th>Prone</th>
<th>Supine</th>
<th>Side-lying</th>
<th>Repositioning</th>
<th>Close proximity</th>
<th>Small group</th>
<th>Large group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evan</td>
<td>81.4</td>
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<td>0.0</td>
<td>4.8</td>
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<td>0.5</td>
<td>33.6</td>
<td>10.7</td>
<td>24.3</td>
</tr>
<tr>
<td>2. Nigel</td>
<td>71.4</td>
<td>0.0</td>
<td>3.9</td>
<td>6.6</td>
<td>16.1</td>
<td>2.0</td>
<td>25.1</td>
<td>41.1</td>
<td>18.4</td>
</tr>
<tr>
<td>3. Anne</td>
<td>56.1</td>
<td>10.4</td>
<td>0.0</td>
<td>24.6</td>
<td>7.0</td>
<td>1.4(^1)</td>
<td>31.2</td>
<td>40.2</td>
<td>15.8</td>
</tr>
<tr>
<td>4. Elise</td>
<td>73.0</td>
<td>22.0</td>
<td>0.3</td>
<td>2.3</td>
<td>0.0</td>
<td>1.9(^1)</td>
<td>46.1</td>
<td>17.5</td>
<td>20.6</td>
</tr>
<tr>
<td>5. Elyssa</td>
<td>94.8</td>
<td>0.0</td>
<td>0.0</td>
<td>4.5</td>
<td>0.0</td>
<td>0.6(^1)</td>
<td>0.9</td>
<td>13.2</td>
<td>85.0</td>
</tr>
<tr>
<td>6. Wayne</td>
<td>76.4</td>
<td>0.0</td>
<td>19.4</td>
<td>2.2</td>
<td>0.8</td>
<td>0.7(^1)</td>
<td>16.4</td>
<td>35.9</td>
<td>45.8</td>
</tr>
<tr>
<td>7. Enya</td>
<td>62.8</td>
<td>8.2</td>
<td>0.4</td>
<td>24.8</td>
<td>2.9</td>
<td>0.9</td>
<td>27.9</td>
<td>41.1</td>
<td>28.7</td>
</tr>
<tr>
<td>8. Liam</td>
<td>97.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.9</td>
<td>0.0</td>
<td>2.0</td>
<td>31.2</td>
<td>14.1</td>
<td>17.8</td>
</tr>
<tr>
<td>9. Alison</td>
<td>42.9</td>
<td>4.0</td>
<td>2.7</td>
<td>13.1</td>
<td>36.0</td>
<td>1.2(^1)</td>
<td>62.4</td>
<td>18.0</td>
<td>17.1</td>
</tr>
<tr>
<td>10. Yanti</td>
<td>29.9</td>
<td>3.3</td>
<td>10.6</td>
<td>3.5</td>
<td>52.3</td>
<td>0.3</td>
<td>67.1</td>
<td>15.6</td>
<td>15.9</td>
</tr>
</tbody>
</table>

Mean 68.5 4.7 3.7 8.7 12.8 1.1 34.1 24.7 28.9 11.9

\(^{a}\) Actual percentages are reported, thus rows which include missing cases do not total 100%.

\(^{b}\) Superscript numerals (1–4) indicate the total number of missing cases for that student and variable.

---

**TABLE 6**

<table>
<thead>
<tr>
<th>Student</th>
<th>Classroom</th>
<th>Playground</th>
<th>Bathroom</th>
<th>Community</th>
<th>Pool/Hydrotherapy</th>
<th>Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Evan</td>
<td>0.0</td>
<td>100.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2. Nigel</td>
<td>82.0</td>
<td>18.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>3. Anne</td>
<td>71.7</td>
<td>28.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>4. Elise</td>
<td>28.6</td>
<td>69.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.7</td>
</tr>
<tr>
<td>5. Elyssa</td>
<td>53.9</td>
<td>46.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>6. Wayne</td>
<td>58.2</td>
<td>41.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>7. Enya</td>
<td>51.8</td>
<td>20.2</td>
<td>12.2</td>
<td>0.0</td>
<td>15.8</td>
<td>0.0</td>
</tr>
<tr>
<td>8. Liam</td>
<td>14.2</td>
<td>10.0</td>
<td>11.7</td>
<td>56.2</td>
<td>0.0</td>
<td>7.9</td>
</tr>
<tr>
<td>9. Alison</td>
<td>64.6</td>
<td>35.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>10. Yanti</td>
<td>76.9</td>
<td>12.9</td>
<td>0.0</td>
<td>0.0</td>
<td>10.2</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Mean 50.1 38.2 2.3 5.6 2.6 0.9

Actual percentages are reported.
validity. These included field trialing of observational codes, the incorporation of feedback from people with expertise in the area into design of the final codes and procedures and use of double entry and file comparison in the preparation of data for analysis. In addition, inter-observer checks for agreement (including the Cohen’s kappa correction for chance agreements) and code-recode activities (Arthur, 2000) were implemented.

In terms of reliability estimates, outcomes for this investigation were generally consistent with those described in similar recent studies, with the exception of behavior states. Mean for inter-observer agreement in terms of behavior states was 83.17% (Cohen’s kappa .77), as compared with 92% and 93%, respectively, in studies by Guess et al. (1993a, 1995) and 92% mean agreement level achieved by Richards and Sternberg (1993). Two issues are pertinent to this finding. First, the narrow range for daily mean behavior states in the present study (75.99 - 92.88%) is encouraging, despite the lower overall mean. Second, the kappa coefficient of .77 is well above the acceptable score of .60 discussed by Gelfand and Hartmann (1975), and is comparable to the overall kappa of .82 for behavior state agreements between teachers and project observers discussed by Ault et al. (1995) in an intervention study. It is important to note, however, that the Ault et al. study involved considerably more observers than the study reported here and as such, the kappa of .82 is an impressive result.

Several issues pertaining to the internal and external validity of the study can be identified. Although seven observers, in total, were involved in the trialing, validation and data collection phases of the study, it would be helpful in subsequent studies to increase the number of people who contributed to the development of appropriate data collection procedures, as well as improving the rigour and diversity of training procedures for these personnel prior to data collection. Similarly, improved protocols for the collection of demographic, medical and other participant data would strengthen the design and contribution of future studies. Additionally, the possible relationship of individual characteristics (such as medical conditions or prescribed medications) to demonstrated social and behavioral profiles could be analysed in a larger sample of participants.

In the same context, it is important to note that generalizability of findings is limited both by the intact sample and the modest number of student participants who were involved in the investigation. Both of these considerations were unavoidable and a function of several factors including low incidence rates and the strict eligibility criteria used in the study. Thus, although students were drawn from three schools (four classrooms), the results are best interpreted with caution, especially in terms of their implications for the wider population of students with profound and multiple disabilities, or the personnel who work with them in educational situations.

**Descriptive Data on Behavior States and Contextual Variables**

In the following sections, the descriptive findings of the study are explored, with particular reference to the research questions, conceptual schema for the study and the relevant literature in this area (see Arthur, 2002). It is important to note that comparison and contrast with this extant data base is guided by the degree to which instrumentation and procedures in the present study resemble or differ from those described in other research programs. For example, behavior state codes used in the current study were very similar to those developed and reported by Guess et al. (1993a), while several of the activity codes varied considerably from others outlined by researchers in the area.

**Behavior state data.** It is interesting to note how the students in the present study fit within the profile groupings described by Guess et al. (1990, 1995). Four students (Nigel, Anne, Elise and Wayne) satisfied criteria for inclusion in the group considered to exhibit an 'impaired alert-response relationship', namely, 75% or more time in awake active-alert or awake inactive-alert states, with above 20% of observed time in the former condition (Profile Group 1, Guess et al., 1990, 1995). Two students (Evan and Enya) comprised the 'impaired alertness due to excessive self-stimulation and crying/agitation' group (Profile Group 3, Guess et al., 1990, 1995), whilst three students (Liam, Alison and Yanti)
demonstrated behavior states that placed them in the grouping for ‘impaired alertness due to excessive sleeping, drowsiness and daze’ (Profile Group 4, Guess et al., 1990, 1995). Finally, Elyssa (Student 5) was placed in the ‘undifferentiated’ category (Profile Group 5, Guess et al., 1990, 1995), although on the day of observation Elyssa was observed to be in an awake (active-alert or inactive-alert) state for a little over 70% of the time. This suggests Elyssa tends to the ‘impaired alert-response relationship’ profile (1), although she does not clearly satisfy the criteria for this grouping, discussed earlier.

Small sample size and serious limitations to reliability of the developmental and medical information collected in relation to participants preclude any discussion of or comparison between, for example, proportions of students in various profile groups or developmental differences between profile groups in the investigation and patterns reported in extant literature (Guess et al., 1993b, 1995). However, in the following section, data pertaining to contextual variables observed in the project are compared with similar studies that have been reported in the research literature and reviewed elsewhere (Arthur, 2002), highlighting several important areas for future investigation.

Communication indicators and partners. In broad terms, the data collected in this study were consistent with several other observational studies of students with severe disabilities in educational settings published in the past ten to fifteen years (for example, Houghton et al., 1987; Peck, 1985). Such studies have highlighted the issues of limited partner responsiveness to student social and communicative behavior and, conversely, the paucity of opportunity for student-initiated and controlled interactions.

Four related issues can be identified in the information about communication activity presented in Table 3. The first of these was the consistently low proportions of time during which the students were judged to be involved in a communicative interaction. This condition involved the exchange of meanings and elements of turn taking between partners and is clearly the most desirable phenomenon in an educational (or any) setting from the perspective of student engagement and involvement. Secondly, in several cases (for example, Students 1, 3, 5 and 7) a large proportion of intervals were observed during which student communication cues were occurring, with no partner response. A third important finding was the relatively infrequent number of partner cues for communication, which resulted in no student response. Finally, the consistently large number of intervals during which no communication behaviour was observed presented as a major issue in this descriptive study.

These findings, reflecting naturalistic conditions in educational programs, are of major concern, especially given the attention paid to the importance of ‘communication-rich’ learning and living environments in much of the recent professional literature (Butterfield, Arthur, & Sigafoos, 1995; Siegel-Causey & Guess, 1989). It is clear that a continuing effort to meet the challenge of supporting and developing partner skills and knowledge, as part of the larger process of communication interventions involving people with severe and multiple disabilities, is warranted. Future work in this area will be especially useful if it is inclusive of all communication partners interacting with an individual, including parents, ancillary staff and other people providing support in various settings (for example, residential caregivers supporting students living in group homes in the community or in congregate care). Interestingly, teacher aides represented, in general, the most common communication partners for the students observed in this study, which may be explained by the emphasis on basic care and support prevalent in all of the participating programs.

Although impractical in the present study, due to the range of codes scored during a ten-second recording rest, it would be helpful in future studies to analyse in greater detail the actual communication forms and functions used by students and their partners, as reported by several leading researchers in this field (for example, Houghton et al., 1987; Linfoot, 1987; McLean & Snyder-McLean, 1987; McLean, Brady, & Etter, 1991). This information could form the basis of individual interventions designed to increase the quantity and quality of communication behaviors in students and those who interact with them, not unlike the procedures followed in
relation to student behavior states in a recent investigation by Ault et al. (1995).

Activity. Collection of information about activities available to participants was based on procedures and codes which were quite different from those reported by other researchers in this area (for example, Guess et al., 1993b; Richards & Sternberg, 1992). In the investigation reported here, activities were coded separately, largely based on the curriculum areas defined by the relevant educational authority, as well as directions suggested by piloting and validation processes. Importantly, the direct and purposeful provision of an activity, along with appropriate materials, was used as part of the coding protocol in this area. In contrast, Richards and Sternberg examined the nature of the stimuli which was provided to gain student attention (for example, Gustatory/olfactory, Visual/motor), whilst Guess et al. embedded activity type and identification of the interaction partner within the larger category of ‘direct social interaction’ (p.17). Accordingly, whilst direct comparison between the data generated in the current study and the published findings of these authors is inappropriate, several general points can be made.

First, the generally high proportion of time during which no activity was occurring for the participants in this study is a disturbing finding. The concept that activities serve as the basis for learning, involvement and meaningful participation by students with severe disabilities has been fundamental to program design and delivery in the past ten to fifteen years (cf. Brown & Lehr, 1993; NSW Department of Education, 1988; Siegel-Causey & Guess, 1989). In light of this, and bearing in mind the limitations of the present study (especially with regard to the generalizability of findings), it is clear that further attention to the question of increasing the amount of time during which activities are taking place in educational settings is necessary. Relatedly, the small overall proportion of time during which therapy related activities were occurring, especially given the complex physical needs of the students in the study, again underlines the need for a thorough and large-scale consideration of the service delivery aspects of programs supporting individuals with profound and multiple disabilities.

Second, when activities were provided, the two categories of independent living (mean 15.8%) and leisure (mean 17.9%) accounted for the large majority of observed intervals. It is important to note, however, that in both domains, there were large individual differences in the amounts of time in which such activities were taking place. Clearly, this phenomenon is a function of the complex interaction between characteristics of individual participants and educational context(s) in which they were observed. Overall, data reported in the present study are consistent with the work of Guess et al. (1993b) who found that activities involving adults in the ‘play/ instructional/other’ domain were most common, followed by self help tasks. However, the small sample size and wide-ranging proportions of time displayed by participants in the present study render further detailed comparison between studies inappropriate.

Finally, it may be appropriate in future investigations to explore in detail the exact nature of the activities provided in educational settings. That is, in the present study a category of activity type (or no activity) was judged in terms of the predominant phenomenon within each ten-second period. However, no qualitative information about the actual type of activity (for example, listening to music, eating a meal) was systematically recorded. This information, especially when considered in relation to behavior state changes in individual students, would be very useful in the analysis and ongoing evaluation of programs for students with the support needs typified by participants in the present study.

Positioning. For participants in this study, being seated was clearly the predominant position (mean 68.5%). This finding is consistent with other researchers, notably Guess et al. (1993b) and Richards and Sternberg (1992), and is probably explained in terms of the advantages of this position for movement of students throughout the day and involvement in basic care routines and activities. However, data pertaining to the supine position is a little more perplexing, to the extent that, given a wide range of individual differences, the mean of 8.7% is considerably lower than the findings of Richards and Sternberg, who found that students spent a large amount of time in this position, and furthermore, tended not to display orienting responses in
this condition. The mean of 14% for the supine position reported by Guess et al., in contrast, is closer to the proportion of time indicated in the present study. Interestingly, there are similar minor differences between average amounts of time spent by students in the sidelying position in the present study and those described by Guess et al. and Richards and Sternberg.

Social groupings. Four categories were used to describe the type of social context experienced by students, based on physical proximity of five feet (following Guess et al., 1991, 1993b) and number of individuals comprising an observed group. Results indicate that overall, students spent important proportions of time in each of the categories of solitary, close proximity, small and large groups. While direct comparison with other studies is inappropriate due to variations in coding definitions and procedures, some general comments regarding the implications and limitations of these data can be made.

First, the large amount of time during which students are solitary (mean 34.1%) is broadly consistent with the findings of Richards and Sternberg (1992) and is deserving of more investigation. Although this phenomenon may in part be explained by the amount of time students spend in sleep states during school hours, the potential loss of engagement opportunities inherent in this finding is of major concern. Second, while a measure of proximity was used to gauge the type of groupings observed in the present study, it would be helpful in future analyses to code the specific composition of groups (adult/student, student/student etc.), as described in other investigations (Guess et al., 1991, 1993b; Richards & Sternberg). In addition, whilst a decision-rule about proximity of others to the student was followed, the codes used in the study did not provide any information pertaining to the behaviors of the group. For example, a student may have been a member of a large group, comprising students and staff, all of whom were within five feet of each other and yet were facing in different directions.

Finally, it would be extremely useful to analyze group processes under a wider range of conditions, including different educational situations (for example, regular schools) and involving other populations, such as students without disabilities (cf. Grenot-Scheyer, 1994). This suggestion can be made, of course, with reference to many of the observational categories used in the present study.

Setting. Participants were observed in a range of settings, including the classroom, playground, community and the swimming pool, with the first two locations accounting for a large proportion of overall time. On average, students spent approximately half of the day (50.1%) in the classroom, with a smaller but important amount of time (mean 38.2%) in the playground. As noted earlier, the small number of published studies in which settings other than the classroom have been examined suggests the need for more attention to the ecological aspects of programs serving this population.

In a study which explored this area, Guess et al. (1993b) coded locations as primary, secondary, community and outside, and found that 75% of the observational period, on average, was spent in the primary location. Differences in code definitions for location (setting) between the present investigation and those reported by Guess et al. make comparison difficult. However, if it is assumed that the primary location in the Guess et al. study was the classroom, this finding contrasts with the present data in relation to the amount of time spent in that setting (mean 50.1%). Conversely, students in the present study spent, on average, a great deal of time in the playground setting, in contrast to a relatively minor proportion of time in the Guess et al. investigation. While these differences may be explained by climate differences between the two research centres, further comparative analysis of the setting variable in educational programs may be an appropriate goal for future study.

Implications

This paper has provided a range of descriptive data emanating from a recent Australian investigation into observed experiences of students with profound and multiple disabilities in educational settings. Notwithstanding some serious limitations to generalizability of these findings, several potentially important educational and empirical implications can be identified. The first of these is the importance of
recognizing individual differences in this population and the related need to set meaningful program goals which focus upon participation, autonomy and ultimately, enhanced quality of life (Ault et al., 1995; Brown et al., 1998). One means of achieving this could be provision of staff development in the area of communication support, with a particular focus on the critical skills of partner responsivity as a means of engaging students and impacting student states. This initiative could be accompanied by an evaluation of ways in which the social opportunities afforded by learning activities can be optimised as a part of the communicative and personal ecology of the classroom.

In conclusion, it is hoped that these findings serve as a catalyst to further studies involving this population. Such investigations should involve larger samples of students with high and complex needs in order to enhance the generalized contribution of the findings. Areas that could be pursued include potential sequences amongst behavior states and contextual variables, the impact of changes in the interactive behavior of personnel upon student involvement and the influence of setting variations on student engagement and alertness.

Appendix 1. Behavior State Codes and Definitions

**AI: Asleep-Inactive**

Person’s eyes are closed. Respiration settled—relatively slow and regular. Body tone is relaxed. Little motor activity (e.g., startle, mouthing, brief limb/body movements) or no motor activity.

**AA: Asleep-Active**

Eyes closed: relaxed body tone. Respiration generally unsettled. Sporadic movements may occur (e.g., tossing, turning, head and limb twitching)—muscle tone generally low between movements. Person may exhibit rapid eye movements (REM). May exhibit occasional facial expressions, vocalisations, thumb/finger sucking.

**DR: Drowsy**

Person’s eyes are either open, with eyelids which appear “heavy”, or eyes are opening/closing repeatedly. Vocalisations or minor body/limb tremors may occur.

**DA: Daze**

Non orientation to visual, auditory, or tactile stimuli predominates. If vision intact, eyes are open, but appear glassy, dull and immobile. Any motor movements are infrequent and non-orienting in nature. Regular respiration. Few or no vocalisations.

**AWIA: Awake-Inactive-Alert**

Person is alert, but not engaged/interacting with person and/or objects. Eyes may be open or closed; if open, some active visual or auditory orientation, focusing or tracking is displayed (orienting/focusing on stimuli, turning head, looking toward stimuli, following stimuli). If closed, some displays of orientation (smiling, leaning toward/away, head turning). Non-orienting motor movements may occur (brief limb/body movements, startles). Regular respiration: vocalisations may occur.

**AWAA: Awake-Active-Alert**

Person engages/interacts by making contact with a person and/or objects. If vision intact, eyes open, bright and active. Visual, auditory or tactile interactive patterns are exhibited with distinct fine and/or gross motor movements. Body movements may be used to avoid stimuli or interaction (pulls away, turning head away). Vocalisations may occur.

**AWASS: Awake-Active-Self Stimulatory**

Person exhibits behaviours that are self-stimulatory or stereotypical (idiiosyncratic, frequent, repetitive and rhythmic movement of body and/or body parts—e.g., touching, headweaving, rocking, mouthing). May be accompanied by crying.
AWASI: Awake-Active-Self Injury

Person engages in deliberate self-injury resulting in bodily harm. May involve whole body movement or specific body parts/limbs (e.g., head banging, biting, pulling hair). May be accompanied by crying.

CR: Crying

Person exhibits intense vocalising, crying or screaming. Respiration may be irregular and eyes may be open or closed. Overall increased tension in body tone; possibly accompanied by motor behaviours indicative of agitation (e.g., flailing arms, tossing around).

Z: Seizures

Seizure behavior, as defined for the individual by relevant caregivers. No other code is scored when there is seizure activity.


Appendix 2. Contextual Codes and Definitions

Communication Indicators

* Communicative interaction (CI)

The student and a partner are engaged in a communicative interaction, involving;
1. the exchange of meanings,
2. turn-taking processes, including cueing and responding behaviours.

Partner cues are defined as any behaviour(s) judged to be a deliberate attempt to elicit communication behaviour in the student. Examples may include a touch on the face, a manual sign, speech, or a combination of cues: ‘how are you today?’ accompanied by the partner positioning themselves in close proximity and smiling.

Student cues are defined as any behaviour(s) demonstrated by the student which is judged to be a potential cue for communication behaviour by a partner. This student cue-

Partner responses are defined as demonstrated behaviours judged to be directly related to a student communication cue. The response(s) may be multimodal.

Student responses are defined as demonstrated behaviours judged to be directly related to a partner communication cue. Whilst these behaviours occur in direct response to the partner cue, they may take some time to occur, be multimodal and/or idiosyncratic. Examples include a vocalisation, eye-flicker, smile, gesture and/or combined behaviours.

NOTE: Although an observed interval may suggest that only one of these aspects predominates, CI is coded if this behaviour is clearly part of a communicative transaction or interaction involving a student and a partner (or partners).

* Student communicative cue: no partner response (SC)

In this condition, the observed student is judged to demonstrate at least one communicative cue, as defined above, without receiving a response from a partner.

* Partner communicative cue: no student response (PC)

In this condition, the partner is judged to demonstrate at least one communicative cue, as defined above, without receiving a response from the observed student.

NOTE: Coding of SC or PC occurs when at least one cue from the relevant person is observed in the 10 second interval.

* No communication behaviours (NC)

In this condition, no communication behaviours by or involving the observed student are noted.

Communication Partner(s)

As this category is a subset of the communication indicators, the type of communication partner (e.g., teacher, aide etc.) is marked;

* if a communicative interaction (CI) or partner communicative cue (PC) is scored for that interval,
* if a student cue (SC) is coded in this interval and there is a potential partner within 3 feet of the student who could be engaged by the student.

In situations where more than one partner is noted, the person judged to be predominant is scored for that interval.

If there is no communication (NC) in that interval, no partner (NP) is scored.

* No partner (NP)
  
  There is no partner observed in a communication process in this interval.

* Teacher (T)
  
  The partner involved in the observed communication process is the teacher.

* Aide (A)
  
  The partner involved in the observed communication process is the teacher aide.

* Peer (P)
  
  The partner involved in the observed communication process is a student peer.

* Other (O)
  
  The partner involved in the observed communication process may be a speech pathologist, parent, volunteer or other person participating in class activities.

**Activity And Materials**

The coding of a particular activity indicates a judgment that;

a. the appropriate materials were available.

  If, for example, Independent Living is scored for student involvement in an assisted eating task, the presence of food and adapted cutlery is inferred.

b. there is evidence of the direct, purposeful provision of an activity.

* Independent living (IL)
  
  This category includes self-help activities, such as toileting, eating and dressing, as well as activities considered to be domestic in nature, including shopping, travel training, food preparation, and packing/unpacking schoolbag.

* Leisure (LE)
  
  This category includes all recreation and leisure activities, examples of which include personally listening to music, playing with toys, riding a bike, or swimming. The category does not include distant or background stimuli such as background music or television.

* Vocational (VC)
  
  Any activity specifically related to work preparation.

* Conceptual (CO)
  
  Structured conceptual activities which have a focus on cognition and understanding. Examples include use of match-to-sample instructional techniques and game formats designed to teach communication symbols.

* Movement/transition (MT)
  
  The student moves or is moved from one location to another. This move must be 2 feet or more from the original location.

* Therapy related (TH)
  
  Any activity specifically and actively targeting therapy goals. Examples include speech pathology, physiotherapy, hydrotherapy and occupational therapy. This category does not, however, include passive aspects of therapies, such as positioning and/or splinting.

* No activity (NA)
  
  The student is not involved in any activity listed above.

**Position Of Student**

* Seated (SE)
  
  The student’s body is bent at the waist at an angle of at least 45 degrees from a horizontal surface.

* Standing (ST)
  
  The student is in an upright position that is at least at a 75 degree angle with a horizontal surface and a portion of his/her weight is borne on legs and feet. If the student is placed in a prone stander he/she is coded as standing when the prone stander is elevated to at least a 75 degree angle and a portion of his/her weight is borne on legs and feet.

* Prone (PR)
  
  The student is on his/her stomach with the torso making contact with a horizontal surface. If the student is placed on a prone wedge the student is coded as prone when the wedge is elevated up to and including a 45 degree angle.

* Supine (SP)
  
  The student is on his/her back with the
torso making contact with a horizontal contact or his/her body can be bent at
the waist at less than a 45 degree angle from a horizontal surface.
* Side Lying (SI)
The student is on his/her side. The back can be making contact with a horizontal
surface, but the pelvis is rotated with the side of the hip resting on the horizontal
surface.
* Repositioning (RP)
The student is clearly being moved from one position to another, or having their
position readjusted.

Social Context Experienced By Student

* Solitary (SO)
The student is alone: no other person is within 5 feet of him/her.
* Close proximity (CP)
There is a person within 5 feet of the student.
* Small group (SG)
The target student is a member of a small group of 3 or 4 people who are within 5
feet of each other.
* Large group (LG)
The target student is a member of a larger group (5 or more people) who are
within five feet of each other.

First published by Arthur, M., Foreman, P., Pascoe, S., Butterfield, N.,
& Bennett, D. (1999). Educational programming for students with high support needs: A report of
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Socio-Communicative Variables and Behavior States

Received: 4 June 2002
Initial Acceptance: 20 July 2002
Final Acceptance: 1 October 2002

Socio-Communicative Variables and Behavior States / 219


Received: 4 June 2002
Initial Acceptance: 20 July 2002
Final Acceptance: 1 October 2002