








# My point of view: Students with intellectual and communicative disabilities express their views on speech and reading using Talking Mats

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## Abstract

**Background:** It can be challenging for people with intellectual disabilities to convey their thoughts and opinions because of cognitive, speech and language impairments. Consequently, facilitating their ability to communicate using augmentative and alternative communication methods is essential. The picture-based framework Talking Mats has been applied in many studies and has been shown to be successful in facilitating communication and soliciting views from individuals with intellectual disabilities and communication difficulties. The aim of this study was to describe the views of students with intellectual disabilities and communication difficulties on speech and reading activities and to examine whether valence scores (from negative to positive) on these views were associated with performance on tests of their corresponding abilities.

**Methods:** This is a cross-sectional quantitative survey study. A group of 111 students with intellectual disabilities and communication difficulties aged 7–21 were interviewed about their speech and reading activities using the visual framework Talking Mats. Their answers were scored on a three-grade like-dislike continuum and were correlated with their results on adapted tests of the corresponding abilities.

**Findings:** The students expressed their views on speech and reading activities. The scored views on speech were positively associated with speech production, and the scored views on reading activities were positively related to reading ability. This suggests that their opinions as expressed through Talking Mats were consistent and reliable.

**Conclusions:** Most students with intellectual disabilities and communicative difficulties can reliably express their own opinions of their abilities when they are provided with a clear visual structure and pictorial support, such as Talking Mats. In this study, this was seen for students with a mild intellectual disability from age

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seven and onwards and for students with a more severe intellectual disability from 12 years of age and onwards.

#### KEYWORDS

communication, intellectual disabilities, pictorial support, reading, speech, Talking Mats

#### Accessible Summary

- The aims were to find out
  - What students with intellectual disabilities and communication difficulties thought about speaking and reading?
  - How consistent these expressed views were with their abilities in speaking and reading?
- Students expressed their opinion on a scale using pictures as required in Talking Mats. Their responses were coded and compared to test results.
- Talking Mats is a programme that uses pictures to help people express their views about what they do. A scale is used to show positive feelings, neutral feelings (e.g., “OK”) and negative feelings.
- Students who did well on tests of speech had positive views about speech in general. Students who did well on tests of reading had positive views about reading.
- These findings suggest that their opinions could be trusted.

## 1 | BACKGROUND

When assessing or studying different abilities, problems, or symptoms in today's person-centred practices, it is considered crucial to first ask the person about his or her own views on abilities or problems. Traditionally, this has not been emphasised for individuals with intellectual disabilities, especially not for children with intellectual disabilities (Stafford, 2017). However, it is becoming increasingly acknowledged that this situation should be changed. Indeed, there are now growing expectations that research, as well as educational and clinical practice, should include the views of people with intellectual disabilities in accordance with the United Nations Convention on the Rights of the Child, Article 12 and the Convention on the Rights of Persons with Disabilities, Article 7. Namely, all children have the right to express their views in accordance with their age and maturity. To achieve this for children with intellectual disabilities and communication difficulties, environmental support and adaptations are necessary.

The research on individuals with intellectual disabilities and communication difficulties often relies on the information provided by proxy raters, such as caregivers, teachers or support workers. This information is then compared to the self-reports provided by the individuals themselves (Perkins, 2007; Santoro et al., 2022). In a recent review by Santoro et al. (2022), research comparing proxy raters with individuals' self-reports found that there can be both agreement and disagreement between self-reports from individuals

with intellectual disabilities and proxy reports. The inconsistency between subjective ratings and proxy ratings in the context of intellectual disabilities may be due to a variety of factors, including differences in perspective and errors of measurement. It is important to carefully consider these factors when interpreting the results of subjective and proxy ratings to accurately assess student abilities and challenges. It is therefore essential to capture the perspective of the student themselves and to use appropriate support to facilitate comprehension and enhance expression (Hartley & MacLean, 2006; Stans et al., 2019).

Individuals with intellectual disabilities are vulnerable to communication difficulties (Smith et al., 2020). Those with severe intellectual disabilities are particularly vulnerable, often presenting a more complex range of difficulties (Smith et al., 2020). Cognitive, speech and language impairments may lead to a need for additional support for an individual with an intellectual disability to be able to communicate effectively. Consequently, individuals with intellectual disabilities may face several challenges when expressing their views and opinions (Murphy & Cameron, 2008). Many individuals with intellectual disabilities and communication difficulties use augmentative and alternative communication (AAC) (i.e., aided AAC—pictures, symbols, speech-generating devices and unaided AAC—manual signs, body communication) to overcome challenges in understanding and to be understood (Beukelman & Light, 2020). Interviews and questionnaires developed for the general population are often too complicated for individuals with intellectual disabilities and

communication difficulties due to demands on literacy and comprehension of abstract language (Santoro et al., 2022). The use of pictures to accompany questionnaires, interviews and conversations, as implemented through Talking Mats (Murphy, 1998; Murphy & Cameron, 2008), has been shown to alleviate cognitive and communication difficulties such as providing means of expression and enhancing comprehension, memory and attention (Boström et al., 2016; Bradshaw et al., 2018; Breeze, 2021; Huus et al., 2021; Stans et al., 2019).

People who have both intellectual and communication difficulties commonly face challenges with literacy as well, and many never learn to read and write (Koppenhaver et al., 2007; Light & McNaughton, 2012, 2019). The problems may be due to both intrinsic and extrinsic underlying factors such as difficulties with working memory (Slattery et al., 2021), language comprehension and word recognition (Tunmer & Hoover, 2019), speech (Dahlgren Sandberg, 2006) and exposure to literacy and high-quality teaching (Light & Smith, 1993). There are a few studies exploring the perspectives of students with intellectual disabilities and communication difficulties on their own reading and writing abilities (Atterström et al., 2021; Myers, 2007). Atterström et al. (2021) conducted a computer-assisted e-mail interview with five students who had severe speech and physical impairments to understand their perspectives on the most crucial factors for learning to read and write. The students highlighted the importance of consistent access to the same AAC device and support from experienced staff. Additionally, they emphasised the importance of persistence as the process of learning to read and write may be time-consuming. Myers (2007) used an attitudinal survey measuring each student's self-perception as a communicator pre and post-the communication and literacy intervention. The attitudinal survey consisted of different statements that the student confirmed or denied; however, no specific results from the students are presented.

The consequences of communication and literacy difficulties are not the only factors limiting people's ability to express their personal views. The dynamic interplay between the interviewer and the interviewee may be affected by a misunderstanding of the questions, but also by a positive response bias or vulnerability to acquiescence (Ellis, 2018; Finlay & Lyons, 2001; Matikka & Vesala, 1997). Ellis (2018) also emphasises that acquiescence may be an artifact of question framing, meaning it is not necessarily a reflection of vulnerability on the part of adults with intellectual disabilities. Positive response bias has been reported as common among individuals with intellectual disabilities, and in a review by Hartley and MacLean (2006), 11 studies reported such a bias. To address positive response bias, Finlay and Lyons (2002) suggested using simple language with clear questions, providing examples and exercising patience. They also recommended using balanced scales with an equal number of positive and negative responses as well as a neutral option, which may help to reduce the tendency towards acquiescence.

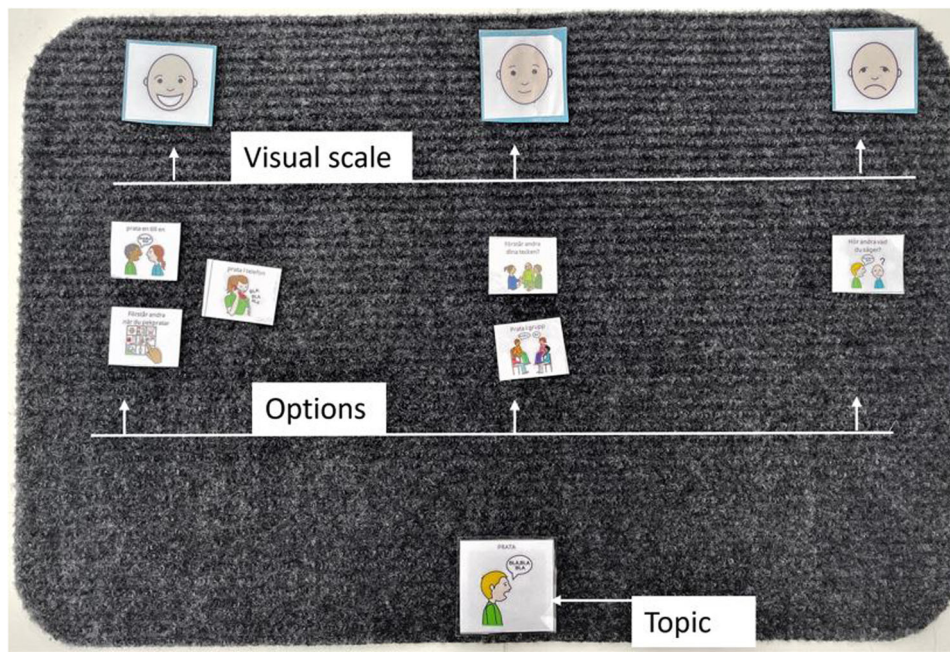
Likert-type scales have been used successfully with people with intellectual disabilities, particularly those with borderline IQ and mild

intellectual disabilities (Hartley & MacLean, 2006). Using 3–5 response alternatives can help to keep the questionnaire and interview concise and manageable, while still providing sufficient information to accurately measure attitudes and views. In summary, it is important to carefully consider the challenges and potential biases that may affect the accuracy of information obtained during interviews with individuals with intellectual disabilities and to use strategies to address these challenges and ensure the reliability of the information obtained.

## 1.1 | The Talking Mats framework

Talking Mats provides a visual framework to enhance communication, visualise views on selected topics and provide a structure in conversations (Murphy, 1998; Murphy & Cameron, 2008; Murphy et al., 2005; Stans et al., 2019). Talking Mats consists of concrete materials in the form of a carpet mat and movable pictures. Using Talking Mats, a specific procedure is followed by applying a set of pictorial materials: a central topic symbol (the subject you want to talk about), a set of option symbols (relating specifically to the conversation topic) and a visual top-scale (often 3–5 rating levels to allow participants to indicate their views, feelings or experiences about each option) (Figure 1). Once the topic is introduced, the interviewer asks the participant an open question such as 'What do you feel about reading?' in relation to each option symbol. The participant is encouraged by the interviewer to place it on an area of the mat corresponding to their view, feeling or experience. The communication partner makes a summary after all the questions have been asked and the participant confirms the final placement of the symbols on the mat. The participant is also invited to add any information they feel is missing.

As presented in the review by Stans et al. (2019), Talking Mats can be used to enable communication and sharing of the views of people affected by communication difficulties for both research and clinical purposes. Three primary themes emerged regarding the objectives of using Talking Mats: facilitating communication, promoting engagement and enabling functional use. Earlier research has focused on the communication of people with a range of different diagnoses such as cerebral palsy, Huntington's, dementia or learning disabilities (e.g., Buchholz et al., 2018; Cameron & Murphy, 2002; Ferm et al., 2010; Murphy, 1998; Murphy & Cameron, 2008; Murphy et al., 2005, 2010). Research on Talking Mats has mainly focused on adults, but some studies used the method for children with intellectual disabilities to facilitate the expression of their views, setting goals and for joint decision-making (e.g., Arvidsson et al., 2020; Backman & Karlsson, 2021; Bunning et al., 2017; Henderson et al., 2015). In the qualitative study by Henderson et al. (2015) three students with severe and profound intellectual disabilities were interviewed by a speech and language therapist and/or school staff with Talking Mats concerning their school experience. Arvidsson et al. (2020) conducted another study involving a large group of 99 students with intellectual disabilities who participated in a



**FIGURE 1** An example of Talking Mats including clarification of symbol types. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/bld.12543)]

quantitative investigation of an instrument for measuring participation using Talking Mats as a method.

The majority of studies using Talking Mats used qualitative methods or approaches to analyse and assess the responses provided by the participants (Stans et al., 2019). There are, however, some studies in which the visual top scale was transformed into a scored rating that enabled quantitative analyses (Arvidsson et al., 2020; Buchholz et al., 2018; Darvell & Bradshaw, 2022; Nilsson et al., 2012). Some of these studies examined the correlation between the scored ratings of participant views with proxy ratings. The current study used a quantitative approach and transformed the views of the students into a three-grade ordinal scale, following a liking continuum (like, neutral and dislike), for statistical analysis.

In sum, the Talking Mats tool has been used in studies involving adults with various conditions, as well as in an increasing number of studies focusing on children. However, these studies often include a smaller number of participants and report qualitative data. The purpose of this study was to explore the views of students attending Swedish compulsory schools for students with intellectual disabilities on their own speech and reading activities. Furthermore, we aimed to determine how scored views, representing ratings on a continuum of 'liking', were associated with test results. This study is important from both child and disability rights perspectives, as it gives a voice to students with intellectual disabilities and explores how their self-reported views correspond to their test results. By using this quantitative method, we hope to contribute to research probing the usefulness of Talking Mats in research and in practice for students with intellectual disabilities.

The study posed three research questions:

- (1) What are the views of students with intellectual disabilities and communication difficulties on their speech activities?
- (2) What are the views of students with intellectual disabilities and communication difficulties on their reading activities?
- (3) Is there a correlation between the grade of liking in students' views on their speech activities and their speech production, and between the grade of liking in their views on reading activities and their reading ability?

## 2 | METHOD

A cross-sectional quantitative survey design was used, correlating Talking Mats survey data to test results. By employing the pictorial framework Talking Mats, students with intellectual disabilities and communication difficulties were enabled to share their views on speech and reading which were the focus of this study. The data used in this study were collected as part of a larger study, Digital Interventions for Literacy Learning for students with intellectual disabilities in need of AAC (Palmqvist et al., 2020), prior intervention.

### 2.1 | Participants

In Sweden, the majority of students with intellectual disabilities are enrolled in compulsory schools for students with intellectual disabilities. These schools have one curriculum divided into two areas: one including more academic subjects and one for students with moderate to more severe difficulties containing the subject areas: Arts, Communication, Motor Skills, Everyday Activities and

Perceptions of Reality. This study received a declaration of interest from teachers representing 137 students attending 39 different Swedish Compulsory schools for students with intellectual disabilities. The inclusion criteria were: (1) communication difficulties, (2) the need for AAC to understand and express themselves and (3) the inability to identify more than approximately 20 written words. The students and their caregivers/appointed legal guardians were provided with written information about the study, with pictures to support understanding and the caregivers/appointed legal guardians gave their written consent. The students also gave their assent in their best possible mode of communication to the researcher when meeting them at the schools. The students' verbal and nonverbal communication was always respected, and testing was stopped if the student showed any signs of discomfort. This study was conducted in accordance with ethical standards and received approval from the Swedish Ethical Review Authority. The data collected were anonymised, and the study followed the World Medical Association Declaration of Helsinki.

Of the 137 students recruited, 26 were unable to comply with the requirements of the TM tool (unable to participate: three mild intellectual disability, 13 moderate intellectual disabilities, nine severe intellectual disabilities and one unknown level of intellectual disability). They were excluded from the study. Additionally, some specific questions were not applicable to certain students, resulting in missing data for some questions (e.g., questions about speech for anarthric students). Regarding speech-related questions, 19 students did not provide responses to all four questions while for reading-related questions, 10 students did not answer all three questions. The sample of participants, therefore, numbered 111 (63 boys and 48 girls). Their ages ranged from 7 to 21 years old, with a mean age of 14 years. Demographic and diagnostic information was collected from the caregivers/legal guardians through telephone interviews (Table 1) and a digital questionnaire filled out by the teachers. All of the students had intellectual disabilities according to the criteria in the International Classification of Diseases, 10th edition (World Health Organization, 2016). The levels of intellectual disabilities were

reported as mild ( $n = 40$ , age range 7–20,  $M = 13$ ), moderate ( $n = 61$ , age range 8–20,  $M = 14$ ), severe ( $n = 6$ , age range 12–19,  $M = 17$ ) and unknown ( $n = 4$ , age range 7–21,  $M = 17$ ). Comorbidity with other diagnoses such as autism spectrum disorder, attention deficit hyperactivity disorder, epilepsy and/or sensory impairment was also very prevalent. A minority ( $n = 28$ ) of the students had a rare specific diagnosis, with caregivers/legal guardians reporting a mix of chromosomal and genetic disorders, which also can include autism as a second diagnosis. Student language comprehension was assessed using a digital questionnaire filled out by the teachers. According to teacher reports, 85% of the students always pointed at pictures when asked to, while 51% were able to follow simple verbal instructions. Furthermore, 19% of the students could follow more complex verbal instructions.

Several AAC methods and tools (i.e., manual signs, pictorial support and speech-generating devices) were used as a complement to speech in student daily school settings. In Sweden, the design and decisions on the individual student's AAC system are usually taken collaboratively involving the parents, school and Habilitation staff (Speech-language Pathologist, Special Educator and Occupational Therapist) sometimes assisted by AAC experts. The variation was wide, from students who were nonspeaking and depended on AAC for all communication, to students who primarily used speech to communicate. According to the caregivers/legal guardians, a large majority used several communication modes for different situations, combining speech with nonverbal communication, pictures, manual signing and speech-generating device. Three students were reported as being familiar with using Talking Mats as one method of AAC. Information about diagnoses and communication modes is presented in Table 1.

## 2.2 | Material and procedure

Interviews and tests were conducted in the student's familiar school environment, the room chosen by the school. All students were

**TABLE 1** Participants divided into subgroups by diagnoses as reported by caregivers/legal guardians, and their forms of augmentative and alternative communication they used.

Diagnostic categories in addition to intellectual disability						
	Intellectual disability no second diagnoses	Autism	Down syndrome	Cerebral palsy	Rare diagnosis	Total
Number of students	23	26	24 (4)	11 (1)	27 (13)	111
Communication mode:						
Nonverbal communication <sup>a</sup>	10	21	15	9	20	79
Manual signing	11	13	22	4	16	70
Pictorial support <sup>b</sup>	16	17	16	8	18	78
Speech generating device	5	1	2	2	4	16

Note: The value in the parentheses behind the number of students refers to the number of students who had Autism as a second diagnosis.

<sup>a</sup>Nonverbal communication includes facial expressions, gestures, eye contact and body movement.

<sup>b</sup>Pictorial support includes pictorial schedules, single pictures, picture communication boards and pragmatic organized dynamic displays (PODD).

allowed to be accompanied by their teacher or assistant, and only a few chose to be alone with the test administrator. The teacher/assistant was passive in the test situation, sitting close to the student. The test administrator and student could communicate with the teacher/assistant at any time during testing. The test administrators sometimes sat beside and sometimes in front of the student depending on the furnishing in the room. Tests for speech production and reading were conducted after the interview with Talking Mats. The first, fourth and last authors conducted the interviews and testing. All three test administrators had previous experience with formal testing of individuals with intellectual disabilities. Both pictures and manual signing were used in addition to verbal communication and instructions from the test administrators, by highlighting the most important words in the sentence. For example, signing the underscored word or pointing at representative pictures on a communication board in this sentence; What do you think (pointing at facial expressions on Talking Mats) about reading words? During testing, the student was given the option of inserting breaks or pauses into the test procedure and choosing what to do during each of these (eating a snack, taking a drink or physical activity).

Three students with intellectual disabilities and communication difficulties, aged 9 (moderate intellectual disability), 14 (mild intellectual disability) and 19 (mild intellectual disability), participated in a pilot study to test the material. The study found no necessary changes based on their performance.

*Introduction of Talking Mats.* Preparation for probing student comprehension of the Talking Mats interview method included an introduction with practice questions before the first question in the interview. This procedure for probing the Talking Mat method was identical to the procedure of the following interview regarding speech and reading activities. The picture representing the topic (animals) was placed at the bottom of the mat by the test administrator. The three-point visual scale with pictures of facial expressions representing a liking continuum formed by the discrete anchors 'Like', 'Neutral/In between' and 'Dislike' was placed on the upper part of the mat (Figure 1). The visual scale was explained verbally and presented with manual signing complementing the speech. The practice mat contained simple questions about the student's liking of different animals (dog, cat, horse, guinea pig and spider). The test administrator presented the animal pictures individually and asked the student, 'What do you think about...?' (manual signing as a complement for the animal word), followed by handing over the picture. The student responded by placing the pictures on the visual scale, aligning with one of the anchors (e.g., Like). Students who lacked the motor ability to place the picture on the scale used pointing (with their hand or eyes) or speech tokens to indicate their response. In these cases, the test administrators placed the pictures on the scale, which was then confirmed by the student, both directly after placement and once more when confirming the placement of all the animal pictures at the end of the interview. Student responses were systematically reviewed by starting from the 'Dislike' anchor and moving towards the 'Like' anchor. The student confirmed verbally or physically (e.g., nodding), one picture at a time.

The students were asked if they felt comfortable with the placement of the pictures or if they wanted to make any changes to their answers.

The test administrators reflected on the four aspects of the confidence rating scale (Murphy et al., 2010) during preparation and interview. These four aspects included: (1) student understanding of the options presented, (2) student involvement with the interviewer and task, (3) student ability to stay on track and (4) the interviewer's understanding of the student's views. However, since the primary aim of the study was not to formally evaluate the Talking Mats method, this evaluation was not conducted systematically. If the student was unable to participate, as indicated by an inability to place the animal pictures on the mat, the test administrator did not proceed with the interview. Also, if the student at any time during the interview showed discomfort, distress or in another way expressed their wish to stop the interview, this was respected.





*Interview with Talking Mats.* For this study, four questions related to speech and three questions related to reading ability were used (Figure 2). The symbols representing the questions were chosen from a free online picture resource ([www.bildstod.vgregion.se](http://www.bildstod.vgregion.se)), produced in colour depending on which symbol the authors deemed most transparent for the question (Judge et al., 2022; Pampoulou, 2017). The mat used for organizing the pictures was approximately 42 × 30 cm in size (Figure 1). The interview took about 10–15 min to complete.

The procedure of interview followed the same procedure as when introducing the concept of Talking Mats using animal preferences. The same three-point visual scale using pictures of facial expressions was presented and each topic was presented in the same way. The test administrator showed the pictures representing the question one by one and asked, 'What do you think about...?' (augmented with manual signing when needed). The student placed the picture on the mat or the test administrator helped those who needed it and received confirmation directly from the student. Following each topic, student responses were confirmed verbally or physically in a similar manner as before, beginning from the 'Dislike' anchor and progressing towards the 'Like' anchor. After the interview, the student was given the opportunity to express any discomfort with the positioning of the pictures or make changes to their answers.

## 2.2.1 | Reading ability

Two reading tests were used to assess reading ability: the OS 64 (Nielsen et al., 1997), Swedish version by Magnusson and Naclér (2011) and OLAF (Magnusson & Naclér, 2010). To enable participation from the students and not overload them, some modifications to the tests had to be made. The OS 64 test was reduced to two practice items and 15 test items, and the OLAF test was reduced to two practice items and 13 test items. In OS 64, the student was presented with the written word [i.e., bok (book)] and were asked to point at the corresponding picture among four

**FIGURE 2** Questions posed with Talking Mats, 1–4 representing TM-speech and 5–7 representing TM-reading. *Source:* Pictures from free online picture resource <https://bildstod.vgregion.se/>. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

	Topic	What do you think about...	
1	Speech activities	...talking one-to-one?	
2		...talking in a group?	
3		...talking on the phone?	
4		... how others understand what you say?	
5	Reading activities	... reading letters?	abc
6		...reading words?	casa amor mano
7		...reading sentences?	Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor.

alternatives [lok (locomotive), lök (onion), cykel (bicycle) and bok (book)] with one picture having phonological similarity. In OLAF, the student was presented with a picture [i.e., hatt (hat)] and was asked to point at the correct written word out of four suggestions [i.e., hat (hate), hatt (hat), katt (cat) and hast (haste)] having phonological similarities. The words in OS 64 contained construction from CV to multiple syllables, and in OLAF from CVC to multiple syllables. The test material in OS 64 was adapted for the student, by replacing the original small, pencil-drawn pictures of the test with Widgit symbols (<https://www.widgit.com>) for better recognition. In Sweden, many schools for students with intellectual disabilities use Widgit Symbols and bildstod.vgregion.se as their primary picture source, making these symbols most familiar to students. Due to the different maximum scores of the tests (OS64: 0-15, OLAF: 0-13), a number of correct responses on OS 64 and OLAF were z-transformed, summed and averaged to be used as a dependent variable for reading ability and used for the correlation with TM-reading.

### 2.2.2 | Speech production

Students were presented with an action picture from Assessment of Phonology, an instrument for assessing the production of phonemes (Frylmark, 2015), and were asked to name things and actions on the picture. There were 28 target words, including a total of 138 phonemes, representing all Swedish phonemes, typically mastered by the age of 6 years (Blumenthal & Lundeborg Hammarström, 2014). The phonemic structure of the words ranged from CVC to complex multisyllables. If a student did not name a target word, the test administrator provided a prompt by pointing at or naming the object or action, asking the student to say or repeat the word. The test

sessions were video recorded and phonemic transcription of all target words was performed by authors one and four on a later occasion. Each phoneme was scored as either correctly produced or incorrectly produced, awarding one point for each correct phoneme [for details on the scoring procedure, see Samuelsson et al. (2023)]. As proposed by Shriberg et al. (1997), the percentage of correct phonemes was calculated by dividing the number of correctly produced phonemes by the total amount of possible correct phonemes and then multiplying by 100. Reliability was excellent, as indicated by an intraclass correlation coefficient of 0.997, and a Cohen's  $\kappa$  with substantial agreement ( $\kappa = 0.78$ ) (Landis & Koch, 1977).

### 2.3 | Analysis

The visual scale on Talking Mats was transformed to an ordinal scale to enable statistic calculations (Like = 3, Neutral/In between = 2 and Dislike = 1). For research question No. 1, the graded responses for the four option questions about speech activities (Figure 2) were used separately. For research question No. 2, the graded responses on the three option questions about reading activities (Figure 2) were used separately. For research question No. 3, to enable the correlation analysis, the sum of the graded responses to the four questions representing speech activities was used as one variable, TM-speech, and the sum of the graded responses to the three questions representing reading was used as another variable, TM-reading.

Statistical analyses were calculated in IBM SPSS Statistics 28. To answer research questions on student views on speech and reading activities, descriptive statistics on the distribution of interview responses across the continuum of 'liking' were calculated. To

compare the difference in the answers regarding the increased demand in reading activity, a nonparametric Friedman's two-way analysis of variance (ANOVA) by Ranks was used. Dunn's pairwise comparisons with Bonferroni Correction were used for follow-up analysis.

To examine the third research question, the graded responses to the four questions representing speech were summed into one variable, TM-speech (Cronbach's  $\alpha=0.64$ ), and the three graded responses to the questions representing reading were summed to the variable TM-reading (Cronbach's  $\alpha=0.76$ ). Pearson's correlations between the summed variables TM-speech and TM-reading and the corresponding test results on speech production and reading ability were calculated.

### 3 | FINDINGS

Descriptive statistics are reported in Table 2. The students displayed a wide range of abilities in speech sound production, with an overall average of 71% of phonemes pronounced correctly. There were six students who produced 100% correct phonemes, but their communication ability was affected in ways other than pronunciation. The twoword-reading tests, OS 64 and OLAF differed in difficulty, with OS 64 being easier. The scores on reading tests were not normally distributed and were close to the lowest level. This was expected

**TABLE 2** Mean (*M*), standard deviation (*SD*) and min-max for percentage phonemes correct ( $n = 103$ ) and the number of correct responses on OS 64 ( $n = 111$ ) and OLAF ( $n = 110$ ), presented for the whole group and divided according to the level of intellectual disability (*ID*).

Variables	<i>M</i>	<i>SD</i>	Min-Max
Percentage phonemes correct	71.3	30.0	0–100
Mild ID ( $n = 39$ )	76.6	26.6	0–100
Moderate ID ( $n = 55$ )	69.7	30.6	0–100
Severe ID ( $n = 5$ )	50.8	45.5	0–97
Unknown level ( $n = 4$ )	65.8	28.4	27–94
Word reading - OS 64	7.6	5.3	0–15
Mild ID ( $n = 40$ )	9.3	5.7	0–15
Moderate ID ( $n = 61$ )	6.7	4.9	0–15
Severe ID ( $n = 6$ )	4.5	3.5	0–10
Unknown level ( $n = 4$ )	9.5	6.5	0–14
Word reading - OLAF	2.7	3.0	0–13
Mild ID ( $n = 40$ )	4.0	3.7	0–13
Moderate ID ( $n = 61$ )	1.8	2.2	0–11
Severe ID ( $n = 6$ )	0.33	0.8	0–2
Unknown level ( $n = 3$ )	6.7	1.5	5–8

considering the inclusion criteria for the study (i.e., that students should have limited reading skills).

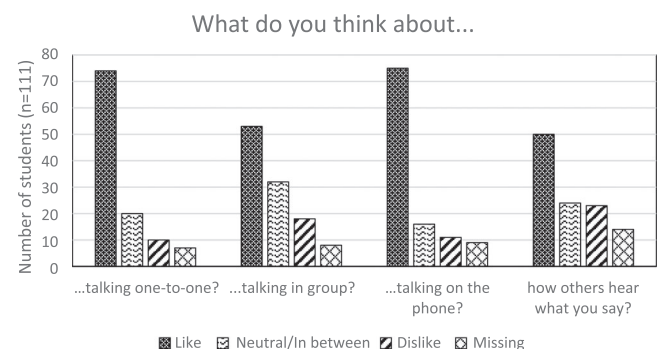
#### 3.1 | Research question No. 1: The students' views of their speech activities

The descriptive statistics of the four questions regarding speech show that most of the students (67%) chose the highest response option (i.e., the happy face) and thus had a positive view of talking to one person at a time. In contrast, fewer than half of the students (48%) chose the highest response option for talking in groups. Similar to talking one-to-one, the students chose high on talking on the phone (68% chose the highest). Finally, only 45% of the students chose the highest score for how the student perceived how others hear what they say. For a detailed distribution of the scores, see Figure 3.

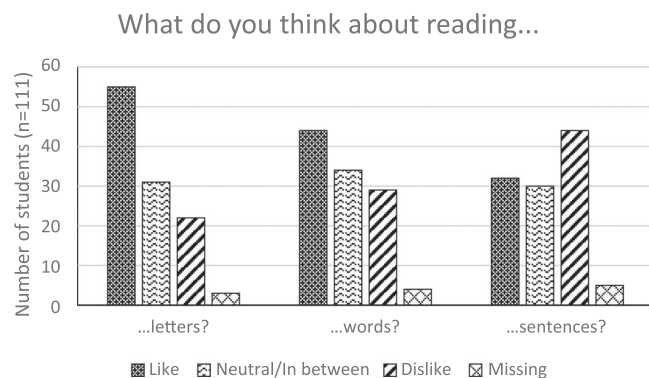
#### 3.2 | Research question No. 2: Students' views of their reading activities

When assessing results for the questions regarding reading activities, namely reading letters, words and sentences, the answers were more varied (Figure 4) than for speech activities. The pattern of the ratings suggests that when the degree of difficulty in the reading activity increases (e.g., reading sentences in comparison to reading words and letters), student ratings became less positive. For the letters, 50% of the students chose the highest response options. For words, 40% of the students selected the highest response options, and for reading sentences, only 29% of the students chose the highest response options.

To examine whether the trend of scoring lower for more complex reading tasks was statistically significant, a nonparametric Friedman's two-way ANOVA by ranks was performed. The ANOVA showed a significant main effect,  $\chi^2(2) = 29.81$ ,  $p < 0.001$ . Dunn's pairwise comparisons with Bonferroni correction for multiple comparisons revealed a significant difference between reading letters and sentences,  $p = 0.001$ . There was no significant difference between



**FIGURE 3** Student responses to the four questions regarding speech activities.



**FIGURE 4** Student responses to the three questions regarding reading activities.

letters and words ( $p = 0.240$ ) nor between words and sentences ( $p = 0.191$ ).

### 3.3 | Research question No. 3: Correlations between student views and speech production and reading ability

The relationship between student-graded responses on TM-speech and their test result on speech production showed a significant, but minor effect,  $r(84) = 0.24$ ,  $p = 0.026$ . Additionally, the relationship between graded responses on TM-reading and reading ability was also significant and small-scale  $r(103) = 0.21$ ,  $p = 0.029$ . Thus, both tested speech production and reading abilities were associated with student views on these activities.

### 3.4 | Response bias

One possible positive response bias was identified in students who consistently reported 'like' on all 20 questions. Among the 111 participants, there were five students (4.5%) who reported all questions with such a positive response pattern. They were all reported to have moderate intellectual disabilities. However, all five students were able to read between 6 and 18 words ( $M = 13.8$ ) on the reading test and there may be a possibility that these students in fact really enjoyed reading as an activity. Thus, they were not excluded from the analysis.

## 4 | DISCUSSION

The results showed that students had a positive view of their speech activities, but a slightly more negative view regarding their reading activities. Additionally, the view on reading activities became more negative as the reading tasks became more difficult. Furthermore, a more positive view on both speech and reading activities was positively associated with performance on the corresponding tests.

It is notable that many students ( $n = 111$ ) with intellectual levels ranging from mild to severe disability were able to participate in this study, given that children with intellectual disabilities often have a low response frequency in conventional questionnaires and interviews (Finlay & Lyons, 2001; Hartley & MacLean, 2006). This study addressed the issue of communication difficulties among students with intellectual disabilities by applying the Talking Mats structure and pictorial support. The results supported the use of this method in helping students with intellectual disabilities to express their views (Murphy & Cameron, 2008). To enhance student comprehension of questions, the spoken questions were accompanied by pictures and manual signing. As a result, almost all students (111 out of 137) were able to participate in the interview. Thus, the result suggests that providing a clear structure with pictorial support, such as Talking Mats, enables students with intellectual disabilities to participate in surveys and interviews. Furthermore, the method was found to be feasible for students as young as seven with a mild degree of intellectual disability and for those from the age of 12 with a severe degree of intellectual disability, although future research is necessary to systematically identify whether there are any specific cognitive and communicative prerequisites for participation and providing valid answers.

Most students responded positively to questions about speech activities. 'Talking one-to-one' and 'talking on the phone' resulted in a similar frequency of positive responses. This could be because both forms of communication involve focused interactions with a single individual, as opposed to the less positive responses to the question about talking in a group setting. Research looking at social interaction reports that students with intellectual disabilities and communication difficulties are foremost communicating with their support staff rather than with their peers even if opportunities to do this occurred (Andzik et al., 2016; Chung et al., 2012; Raghavendra et al., 2012). The support staff also tend to be in closer physical proximity to the child with an intellectual disability (Luttrupp & Granlund, 2010), and this may also hold true for our group of students. As a result, it is likely that speaking with one person at a time is the most prevalent form of communication among our students. There were also 32 students who placed the question 'talking in group' in between like and dislike and 18 on dislike which might indicate that different group settings offer different preconditions. Expressing yourself in a group setting (e.g., in the classroom) may put more stress on the ability to produce speech and be understood. Clearly, this result indicates that more research is necessary to explore how children with intellectual disabilities view their role as conversation partners in groups and in one-to-one situations.

Despite the positive responses to three of the questions about speech activities, student views on how others understand their speech were more negative than the other questions. The relatively high mean score of speech production in single-word production may indicate that the comprehensibility of single words is easier than connected speech in everyday life. This may depend on various factors such as context, familiarity, voice loudness and voice quality (Miller, 2013). For communication partners of individuals with

intellectual disabilities and communication difficulties, understanding connected speech may be more challenging than understanding individual words (Alameen & Levis, 2015; Iacono, 1998). This could be an indication of the degree of difficulties these students face when trying to speak to others, and arguably, how important AAC can be if it helps individuals to make themselves understood (Beukelman & Light, 2020).

Interestingly, the positive correlation between students' self-reported views and their test scores suggests that this group has some capacity to reflect on these activities on a higher metacognitive level. This is particularly noteworthy given that individuals with intellectual disabilities often have difficulty with metacognition as compared to their typically developing peers (Cornoldi & Vianello, 1992). There was a clear trend in the results that easier reading activities (reading letters) were rated more positively than more complex reading activities (reading sentences), a finding that also speaks for a metacognitive awareness in the group. Our findings suggest that children with intellectual disabilities can express their views on speech and reading activities with some distinctions between specific aspects of reading. Further, the significant correlations obtained between students' self-reported views and their test scores show that many have the capacity to reflect on these activities at a higher metacognitive level. Thus, findings from this study suggest that with Talking Mats, students with mild to severe intellectual disabilities can indeed express their views in a nuanced manner and engage in some degree of higher-order metacognitive reflection with respect to speech and reading activities. It is likely that they can provide valuable insights that can inform the development of educational and therapeutic interventions, making it important to involve them in the design and evaluation of such interventions.

There is a paucity of research on the enjoyment of reading in children with intellectual disabilities, using either self-reports or proxy reports. Our study provides novel information in this regard. The focus on the enjoyment of reading and its positive relationship to reading ability has been well-researched among students with typical development (e.g., Rogiers et al., 2020; Smith et al., 2012). Our findings regarding the correlation between positive views on reading activities and reading ability in students with intellectual disabilities mirror the general findings of a positive relationship between enjoyment of reading and reading ability. However, it is important to keep in mind that students in special education may have different experiences and perspectives when it comes to constructs and concepts than peers without special education needs. These differences can be influenced by a variety of factors, such as their developmental level, cognitive abilities or social skills, and may affect the results between views on reading and corresponding test results in different directions.

To further discuss methodology in our study, the questions used were framed as 'What do you think about...?' and were answered on a three-point scale, which may have affected the accuracy of the measurement and restricted the distribution of data (Hartley & MacLean, 2006). Reducing the number of options may result in the scale not capturing the nuances and subtleties of participant attitudes

or behaviours. Additionally, it may create a ceiling or floor effect, where the data becomes skewed towards the highest or lowest rating. This can be particularly problematic when researchers are trying to distinguish between subtle differences or changes in a variable. On the other hand, utilising very many options and alternatives may become too complex (Boström et al., 2016)—so an important topic in the development of assessment formats is to find the sweet spot where students with intellectual disabilities will be able to understand and complete the task while simultaneously maximising opportunities to express views with as many nuances as possible.

In the review of Hartley and MacLean (2006) regarding the reliability and validity of Likert-type scales for people with intellectual disabilities, positive response biases have been reported and it is most likely to occur with more severe levels of intellectual disabilities. The way the questions are asked is always important to consider, especially when asking individuals with intellectual disabilities (Ellis, 2018). The framework of Talking Mats and the neutral questioning approach can help people to express dissatisfaction (Bell & Cameron, 2008). Still, being able to express dissatisfaction may not have been the case for all participants in this interview. During the practice questions with animals, used to probe the understanding of the Talking Mats method, apparent acquiescence was noted, and those who were not able to understand the method were not offered the interview questions. While there was no clear indication of bias during the practice questions, we found that an additional 4.5% of students who answered all the questions may have exhibited a positive response bias. These five students achieved moderate to good scores on their reading test, suggesting that they may have genuinely enjoyed the reading activity and given positive ratings accordingly. Yet, there was a positively skewed distribution on both speech and reading activities which may indicate a positive response bias for more questions that we did not detect.

The interview does not present any right or wrong answers, it is the students' own choice to place the pictures and the choices made have not been questioned. In accordance with UNCRC, Article 12 and CRPD, Article 7, all students have the right to express their views, and all answers were respected. There were, however, some situations where it was difficult to know if the student understood the question correctly even when augmenting pictures and manual signs were used.

#### 4.1 | Limitations and future research

The research design was based on quantitative data although Talking Mats was originally developed mainly as a qualitative instrument. Although novel and of relevance to researchers and practitioners alike, the associations between student views and test results should therefore be interpreted with some caution. The use of Talking Mats was also limited in students' everyday life, only three of 111 caregivers/legal guardians reported that their child had used Talking Mats before taking part in our study. Consequently, a limitation of

this study may be that if the students were more familiar with the method, they may have been more confident in rating their views on the mat.

All 111 interviews were video recorded in case any questions regarding student participation needed to be addressed. However, one limitation of this study is that a formal measurement of validity using a structured observation schedule of completed Talking Mats has not been conducted. The test administrators based their decisions on whether the student responses were valid on performance in the introduction mat, rating liking of animals, and then paid attention to student participation and understanding during the interview.

Future research may include questions with other content and examine correlations between the views students expressed and formal testing. By listening to and valuing the perspectives of these students, researchers can gain a more complete and accurate understanding of their perspective and, potentially, use this information to develop more inclusive and suitable interventions.

The perspectives of caregivers and schoolteachers may also bring another dimension to the student's own point of view on speech and reading activities. How schoolteachers and caregivers rate student ability in relation to student ratings could contribute to an even deeper understanding of students functioning, abilities and perspective in the domain.

## 5 | CONCLUSION

More research is necessary; however, still, the voices of the 111 students in this study speak for themselves. When provided with adequate communication support, here the Talking Mats method with pictorial support and a clear visual structure, individuals with intellectual disabilities and communication difficulties are able to express their views. This means that opportunities for this population to be heard and take part in decisions concerning themselves must be reconsidered and that proxy responses as an assessment may be avoided more frequently. These results showed that there is an association between student views on speech and reading activities and their performance on corresponding tests. Specifically, the students have an awareness of their speech production in relation to how they perceive their speech in communicative activities and their reading competency in relation to how they perceive their reading activities.

Including students with intellectual disabilities and communication difficulties in research can be challenging. However, it is our responsibility to follow the United Nations Convention on the Rights of the Child, Article 12, and the Convention on the Rights of Persons with Disabilities, Article 7 to ensure that these students are included. To overcome these challenges, we state that the provision of a clear structure and pictorial support such as in Talking Mats can facilitate communication and enable students with intellectual disabilities and communication difficulties to express their views so that others can understand.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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