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Blissymbol learning as a tool for facilitating language and literacy development

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In this study we investigated the learning of Blissymbols by 4 pre-schoolers with Down's syndrome over a period of 7 months. The results of the study suggest that the children did derive some benefits from the exposure to and the learning of Blissymbols. However, some key issues were identified that need to be considered in the use of Blissymbols for literacy and language learning. These include the number of symbols and time spent teaching these, the word classes of the words taught, the frequency of exposure to each word, children's familiarity with and interest in the themes used in teaching as well as visual complexity of the symbols. Results confirmed the complexity of the process of symbol learning for young children with disabilities.

Introduction

The acquisition of language and literacy skills by young children remains an important issue in facilitating integration and participation in society. The role of graphic symbol systems in the development of these skills is not a new area of research in Augmentative and Alternative Communication (AAC). AAC systems refer to those techniques and strategies used to compensate for the severe expressive communication disabilities of people (Beukelman & Mirenda, 1998: 3). This means that these systems are used primarily to facilitate a person's interactions with those around him/her. Various authors have identified a link between the introduction of AAC systems and language enhancement in children who have little or no speech. Within the domain of AAC intervention, various strategies including gestures, pictures and line drawings such as Blissymbols and Rebus have been used to support the development of language and reading skills.

The benefits of using a visually orientated training approach for children with Down's syndrome have been well described due to their general problems in auditory processing. The use of visually orientated approaches such as the use of gestures or graphic symbols reportedly enhances the development of language, especially expressive language (Launonen, 1996). Much success has been reported by Shepperdson (1994) and Buckley and Bird (1993) in getting these children to read traditional orthography even though initial progress could be slow. It is because of the difficulties inherent in teaching an arbitrary system (such as traditional orthography) to children with mental disabilities that the use of an easier symbol system as a bridge into literacy becomes attractive.

The use of easier graphic systems such as Bliss could provide a meaningful medium through which the child can explore language.

Graphic systems refer to symbol systems that include symbols that are spatial and temporal and are conveyed through the visual modality (Musselwhite & St Louis, 1988). Bliss is a semantically based system, which means that it is based on concepts rather than on words and comprises a small number of geometric forms with each element representing a unique meaning. It is easier to learn than traditional orthography (Clark, 1981; Mizuko, 1987; Mirenda & Locke, 1989), yet uses skills such as analysis and synthesis of different elements that underpin traditional orthography. Exposure to print is reinforced by always accompanying the Blissymbol with the written word. Not only can the child achieve success sooner, but the generative characteristics of the system also ensure that the child is exposed to unlimited concepts. The impact which learning a conceptually based symbol system has on the child's mastering of reading and writing skills which requires the acquisition of a letter-based symbol system has, however, not been well researched.

As Blissymbols have traditionally been used for communication with people who have no or very little speech, their application to the area of language expansion and literacy learning has only been addressed peripherally. In view of the importance of literacy learning for children with mental disabilities, however, it is essential that a better understanding be acquired of the process involved in learning conceptually based symbol systems and their possible impact on the child's language learning. Hence it is imperative that more research be undertaken to establish how children acquire Blissymbols and which factors influence this learning process.

The processes used in the decoding and understanding of different kinds of symbol systems have received a fair amount of attention in the AAC literature. Various studies have been done on the differences between symbol sets and systems as regards the ease of learning, iconicity and visual complexity (Hurlbut, Iwata & Green, 1982; Ecklund & Reichle, 1987; Mizuko, 1987). Although these studies have contributed to a better understanding of the processes involved in learning to attach meaning to symbols within an experimental context, few studies have described the processes and factors that could influence the learning of Blissymbols by children with disabilities within a more natural context.

In a previous study, Alant (1994) described the learning of Blissymbols by 4 children with Down's syndrome during an 8-week period. In that study it became clear that, although all the children learned the Blissymbols and were able to retain these symbols ade-

quately after a period of instruction, the errors they made were quite inconsistent. The main features of their errors in matching the Blissymbols with pictures related to the following:

dentist	
teeth	
elephant	
nose	
on	
sit	
action indicator	
legs	
walk	
grasshopper	
jump	
lion	
hair	

- Identification of a common characteristic between picture and Blissymbol, for example, "dentist" was substituted with "teeth", and "elephant" with "nose". In most of these cases, the Blissymbol was then substituted with a visually less complex symbol which the child associated with the picture. The children seemed to identify a salient feature of the object or picture and matched

this with the most appropriate Bliss element or symbol. This dominance of the meaning of the concept in the identification of the symbol was also prevalent in the substitution of "on" with "sit", resembling a chair.

- Confusion between nouns and verbs, as the children tended to disregard the action indicator. An example would be a pair of stick figure legs denoting 'legs' as opposed to a pair of stick figure legs, with the action indicator above them, denoting 'walk'. However, this could also have been caused by the global approach to teaching symbols during this process.

- Substituting symbols with others that were more visually complex. In these cases, most of the substitute symbols contained a strong visual resemblance to the substituted symbol, for example, "grasshopper" substituted "jump", and "lion" substituted "hair".

The present study aimed to expand on the first study by describing Blissymbol learning of 4 young children with Down's syndrome within a preschool class over a period of 7 weeks. A broader variation of vocabulary and word categories to facilitate understanding of processes and factors involved in the learning and retention of Blissymbols, were used in an attempt to describe the acquisition and learning process more comprehensively. Specific aims were to describe:

- The subjects' performance on symbol learning across themes
- The subjects' performance in relation to the number of symbols taught and the period (number of days) exposed to the symbols
- The word classes of the words taught and frequency of exposure of each word during the teaching period
- The visual complexity of the symbols taught and its relationship to subjects' performance on symbol learning.

Method

Subjects

A small group design was used to describe the learning of Blissymbols by 4 preschoolers with Down's syndrome within a natural context. The children included in this project were enrolled at a nursery school for hearing and language-impaired children. All the children were in the same class and received training in Blissymbols. Table 1 provides a description of the subjects.

Table 1 Description of the subjects

Characteristics	Subject 1	Subject 2	Subject 3	Subject 4
Gender:	male	male	male	female
Mother tongue:	Afrikaans	Afrikaans	Afrikaans	Afrikaans
Diagnosis:	Down's syndrome	Down's syndrome	Down's syndrome	Down's syndrome
Chronological age: (years, months)	7,0	6,5	6,7	4,7
Developmental age: (months)	56 months	52 months	42 months	37 months
* (DASI-2)				
Verbal comprehension: (years, months)	4,06-4,07	3,03	2,10	3,00
** (Reynell)				
Mean length of utterance	5-6 words	4-5 words	2-3 words	2-3 words

* DASI-2: The developmental Activity Screening Inventory (Fewell & Langley, 1984) was used to assess the subjects' level of cognitive functioning.

** Reynell: The verbal comprehension scale of the Reynell (1969) was administered in addition to the TACL-R, in order to form a better idea of the subjects' receptive language skills

From Table 1 it is clear that the chronological ages of these subjects varied from 4.7-7.0 years and receptive language abilities ranged from 2.10-4.07 years. All subjects included in the study were speaking, although their expressive language skills were delayed.

Procedure

Symbol selection

The themes assessed in this study were the themes used in the classroom and were selected by the teacher. The teacher selected the symbols according to the theme for each particular period. Vocabulary (Blissymbols) was selected bearing in mind language enrichment. The number of symbols selected for each period varied according to the need identified by the teacher. Themes that were covered (in chronological order), the amount of time spent on each theme as well as the number of symbols taught during the theme are provided in Table 2. Only one theme covered during the research phase, namely "pets", was not included in the analysis due to the absence of two subjects during the two weeks of assessment.

Table 2 Themes covered during the research period (in chronological order of presentation)

Theme	Days of exposure	Number of symbols introduced	Ratio: Symbols/ days
1. Healthy foods	11	114	10.4
2. Autumn	5	34	6.8
3. Farm animals	10	148	14.8
4. Wild animals	9	76	8.4
5. Day and night	10	91	9.1
6. Winter	5	52	10.4
7. Dairy products	11	108	9.8
8. Transportation	11	157	14.2

Teaching of symbols

The symbols were taught over an extended period of 7 months. The period of exposure as well as the number of symbols taught varied for each theme, depending on the familiarity of the theme as well as the difficulty of the concepts as perceived by the teacher. The ratio for the number of symbols to the number of days spent on teaching these symbols varied from 6.8 to 14.8 (Table 2). Blissymbols were taught to this particular class as part of the regular preschool curriculum. The symbols were taught by the teacher on a daily basis in the classroom situation for approximately 45–60 minutes, and displayed in the teaching context for the whole school day. In addition, subjects received individual training for approximately 15 minutes per day. The selected symbols also formed part of the children's homework and the parents were requested to reinforce the meaning of the particular symbols at home.

Symbols were also used in a theme-related story, which formed part of the children's homework. These stories were, however, not taught in the classroom due to a lack of time. It was therefore optional and up to the parents to read and discuss the stories at home. No data were obtained to account for variation in performance attributable to the amount of exposure to the symbols at home.

Each theme was introduced in the same manner and a consistent school routine was followed during the 7-month period of implementation. The teacher followed a global approach to teaching Blissymbols, meaning that the Blissymbol as a whole was presented without referring to the different symbol elements, or analysing and synthesizing the symbol elements. Specific indicators such as the plural, verb, and diminutives were, however, pointed out. The teacher also tried to aid visual memory of the symbol by using ideas from Picture-your-Bliss, such as pointing out the visual resemblance of the symbols to the real objects and, where possible, helping the children act out the symbols. In the teaching of the symbols, particular steps were followed by the teacher (See Table 3). These same steps were consistently followed for the remainder of the period in which the theme was taught. New symbols were introduced every day and objects/toys were added to the object board on a daily basis.

Table 3 The teaching of Blissymbols

Steps followed	Procedure
Step 1: Experiencing the concepts	All the children of the school went on a field trip, which was related to the theme of that week [see Table 2 for an outline of the themes]. The aim of the field trip was to provide the children with the real experience and to bring them into contact with the actual objects. The teacher focused the children's attention on concepts, which were to be included in training and provided language stimulation throughout the outing. No formal work was done on this day, as the children left for home after the outing. No Blissymbols were thus introduced on day 1. Steps 2-10 were followed each day of a particular theme.
Step 2: Introduction of the object table	During this phase, the class commenced with an introduction of an object table. The objects and/or toys related to the vocabulary to be taught on that particular day. The teacher and the children had an informal discussion about the objects, relating this information to their field trip. New concepts were explained, demonstrated and acted out where necessary, in order to highlight the meanings of the concepts. This table was displayed in the classroom throughout the day.
Step 3: Introduction of the interest board	The interest board contained pictures relating to the vocabulary to be taught on that particular day. Pictures were matched to the objects on the object table (step 2) and then pinned onto the interest board.
Step 4: Teaching of the Blissymbols for a particular theme	The Blissymbols were presented as follows: <ul style="list-style-type: none"> - Global presentation of the Blissymbol on a flash card - Naming of the symbol - Association of the symbol with the objects and pictures - Identification of indicators [plural and action indicators as well as diminutives]
Step 5: The Blissymbol board	A Bliss board depicting all the vocabulary was displayed in the classroom throughout the week. Not all the symbols were introduced on the first day, and therefore the symbols were added onto the Bliss board as they were taught.
Step 6: Blissymbols in sentences	As soon as all the new symbols had been introduced, the teacher made sentences with the Blissymbols and the children were asked to read them. New and old symbols were used in the sentences. The teacher also asked comprehension questions, where children had to match the correct picture to the sentence.
Step 7: Drill work	After the group work, the teacher drilled the children individually for approximately 10–15 minutes a day.
Step 8: Homework	This work was then sent home, and it was the parents' responsibility to reinforce the symbols with their children at home.
Step 9: Daily review of the symbols	Before the introduction of the new symbols the teacher reviewed the previous day's symbols, by means of informal testing within the group.

Testing of symbols

Subjects' knowledge of the symbols was tested on 3 different days after the last theme had been completed at the end of 7 months. Each subject was tested individually in a quiet room. The same books and materials that had been used in the classroom for training were used in the test situation. The book was placed in front of the subject and

instructions were as follows: " [Subject's name], I want you to read the sentences to me. If you don't know the word, you can tell me so, or take a guess." The examiner then pointed to each word and the subjects responded. This was necessary, as the subjects tended to skip the words they did not know. Each subject was tested on all the symbols that had been taught. However, test sessions did not exceed 30 minutes to prevent fatigue. Subjects were rather seen repeatedly for 30 minutes with breaks in between. The individual's response was noted as either correct or incorrect. Subject 4 was not tested on all the themes due to poor co-operation and a number of absences.

Results and discussion

Subjects' performances across themes

The subjects' performances in the different themes are presented in Table 4.

Table 4 Summary of individual subjects' performance on the different themes

Themes	Mean % correct on each theme for subjects				
	All subjects	S1	S2	S3	S4
Theme 1: Healthy food	56	63	54	50	*
Theme 2: Autumn	61	79	56	47	*
Theme 3: Farm animals	48	68	49	41	32
Theme 4: Wild animals	53	62	59	51	41
Theme 5: Day and night	53	76	63	46	25
Theme 6: Winter	56	71	69	50	34
Theme 7: Dairy products	61	74	71	59	38
Theme 8: Transport	59	74	59	43	*
Mean % correct for all 8 themes	56	71	60	48	34

* Subject 4 was not evaluated for themes 1, 2, and 8, as she was absent for a period of time. No scores are therefore provided.

Table 4 indicates that the mean number of correct responses by the subjects ranged from 34–71%, which points to a considerable variance in performance among the subjects. However, when considering the range of percentage of correct responses per individual subject (thus the difference between the lowest and highest percentage obtained by each individual subject), variances are smaller. The scores of subject 1 ranged from 62–79%, thus displaying a variance of 17%. Subject 2 had a variance of 22%, subject 3 a variance of 18% and subject 4 a variance of 16%. This indicates that although their learning capacity for the number of Blissymbols differed, the percentage of correct responses remained fairly similar.

The subjects' mean performance was the best for theme 2 (Autumn: 61%) and theme 7 (Dairy products: 61%) and their weakest mean performance was on theme 3 (Farm animals: 48%). Generally it appeared as if the subjects tended to perform better on the themes introduced later on in the training period (themes 7, 8 and 6) with the exception of theme 2. A shorter time lapse between teaching and testing of the symbols could have positively influenced subjects' performance on these themes. Increased familiarity with the symbol-learning task might also have played a role here. Subjects did seem to become more comfortable with the process of symbol learning as time progressed. The good performance on Theme 2 (Autumn) seems surprising. However, when consulting Table 2 it becomes clear that this theme included the fewest symbols with the lowest ratio of symbols

taught per number of days exposed. Subjects were thus exposed to fewer symbols during these days, which might have impacted on their ability to learn and retain symbols.

Number of symbols taught in relation to time spent teaching the symbols

Table 2 provides information on subjects' performance on symbol learning in relation to the number of symbols taught per theme as well as the total amount of time spent on each theme. One would expect superior performance for lower ratios (i.e. proportionally less symbols taught within a certain time frame). In Figure 1, themes are arranged according to mean performance of subjects (Table 4) from left (best performance) to right (worst performance), and the ratio of number of symbols taught to time spent on the theme (Table 2). Figure 1 indicates that there was no definite pattern in the performance of the subject in relation to the number of symbols taught within a specific period. For themes 7 and 8, subjects performed better than the ratio would have predicted, while worse performance was observed for themes 4 and 5. The influence of a shorter time laps between teaching and testing of symbols might have prompted better performance in themes 7 and 8. However, different factors impacting on symbol learning, for example, the familiarity of the concepts learnt and the subjects' interest in a particular theme complicate interpretation of these data. Apart from teaching variables, these data highlight the impact of learner variables on symbol learning (Fuller & Lloyd, 1997: 222).

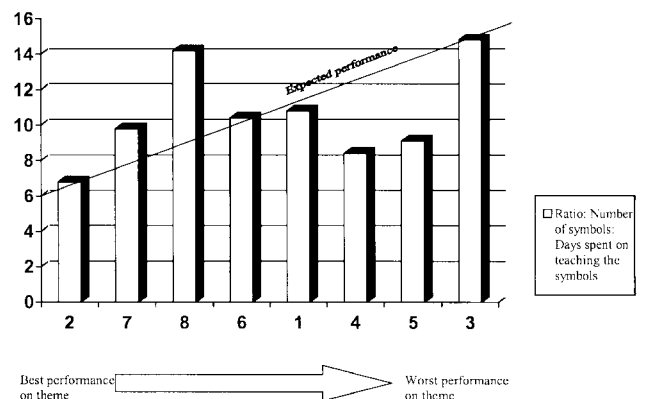


Figure 1 Students' performance on ratio of symbols taught to days spent teaching them for each theme

Words taught and exposure

Table 5 provides the number of different words the subjects were exposed to, grouped according to word class, as well as the number of words that occurred with a certain frequency.

From Table 5 it would appear that 74 different nouns occurred only once within the theme teaching periods. This means subjects were exposed to 74 of the total 116 nouns only once. The table indicates that during the 7-month period there was generally little repetition of vocabulary. A total of 163 concepts only occurred once. Although some verbs such as "eat" and "to be" as well as certain prepositions and articles occurred frequently, there were very few nouns and adjectives that were repeated more than 3 times across the different themes. Articles and the conjunction word "and" occurred frequently, as opposed to some of the undetermined numerals, adjectives and adverbs, which only occurred once. The unrelatedness of the themes also suggests that basically new vocabulary was taught with every theme. This is an important observation in view of the subjects' overall poor retention of symbols. Their superior retention of symbols taught closer to the testing date (Table 2), might also be linked to inadequate storage of the symbols in long term memory due to limited exposure.

Table 5 Number of words per word class and frequency with which subjects were exposed to these words within the teaching context

Word class	Frequency of exposure																	Total number of different words per class	Total number of exposures to any member of a particular class	
	1	2	3	4	5	6	7	8	9	10	11	12	13	16	21	22	60			89
Nouns	74	23	9	4	5							1							116	200
Verbs	29		2		3	2				1			1				1		39	145
Pronouns	2		1	1		2	1			1	1								10	60
Prepositions	7	2	1												1				11	35
Articles														1				1	2	105
Adverbs	17	1							1										19	27
Adjectives	28	12	1	2		1													44	69
Numerals	1	1	1		1														4	11
Undetermined numerals	5	1	1								1								8	21
Conjunctions				1												1			2	26
Total	163	40	16	8	9	5	1	1	1	1	2	2	1	1	1	1	1	1		

Visual complexity

Finally, the themes were analysed in terms of the visual complexity of the symbols included. Visual complexity of symbols was analysed in terms of the number of strokes required to draw the symbol. Number of strokes is determined by half circles, dots and straight lines and each of these is considered one stroke (Fuller & Lloyd, 1987). Figure 2 represents the subjects' performance on recognition of symbols defined in terms of the number of strokes required to compile the symbols.

Figure 2 indicates that accuracy generally decreased with increase in stroke complexity. However, the 30-stroke symbol "ice-cream cart" (☉ ⊗ ↑ □ ⊞ →) was relatively well remembered. Motivation for learning this concept might have played a significant role here. In addition, this performance highlights the impact that increased visual complexity can have in supplying more detail to the learner and thus increasing the transparency or visual similarity to the object (Fuller & Lloyd, 1987; Fuller, Lloyd & Stratton, 1997:78).

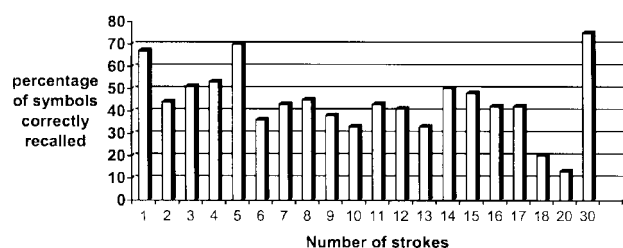


Figure 2 Mean performance of the subjects' accuracy in symbol recall in relation to visual complexity of symbols as measured by number of strokes

Conclusions

The results from the present study show that the subjects were able to memorize some of the Blissymbols that they were taught within a theme-based approach as part of the general classroom curriculum. However, in spite of a dedicated and experienced teacher, and many contextual cues given while teaching and also while being tested (the subjects had to 'read' the bliss sentences), the average accuracy for recall ranged from 48–61%. This finding demonstrates the relative difficulty that subjects had in learning and memorizing the symbols.

Various factors that could have impacted on the retention of these symbols within a natural classroom context were discussed. These include:

- Time lapse between teaching and testing,

- Number of symbols taught in relation to the time spent on teaching a theme,
- Subjects' interest in the theme taught,
- Word class to which the symbols belonged and relative exposure to different word classes during the 7 months of training,
- The visual complexity of the symbols.

Although, as pointed out before, a number of studies have been conducted to examine the impact of learner, symbol and teaching characteristics on symbol learning, all of these have been conducted within a controlled experimental context. This study highlights the need for further studies on symbol learning within a natural classroom context, as it is the interaction between the different variables, which seems to impact significantly on the learning process. Until this interaction between variables is better understood, teachers will have to rely on their own intuition and professional judgment in selecting symbols and structuring the learning process.

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Working towards inclusive education in South African classrooms

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“By inclusive learning we mean the greatest degree of match or fit between the individual learners’ requirements and the provision that is made for them.”
CSIE, 2000:2

The predominant objective of any education system is one of providing quality education for all learners in order to enable them to realise their full potential, thereby enabling them to contribute to and participate in society. During the last two decades international policy development has turned the focus on providing quality education for all learners within the mainstream of education, thereby removing the stigma and stereotyping of learners with barriers to learning. South Africa has also accepted educational approaches that facilitate movement towards more inclusive forms of education. Intensive attempts are made to identify the barriers to learning and development and to provide all children and young people with equal access to quality education. The most important problem that has to be overcome in this process, is the training and empowerment of teachers to identify and effectively support learners who experience barriers to learning. This article gives an overview of the problems facing the educational front in South Africa in this regard and discusses three instruments that have been developed during the last eighteen months to empower teachers to meet the needs of all learners in their classrooms.

Introduction

The predominant objective of an education system, is one of providing quality education for all learners in order to enable them to realise their full potential and thereby meaningfully contribute to and participate in society. The recognition that education is a fundamental right and therefore needs to be freely available to all learners, underpins the notion that the education system should provide for and sustain such learning for all learners (RSA Constitution, Act 108 of 1996, sec. 29:1). Key components of the new South African Education Policy are: meeting the needs of **all** learners and actualising the full potential of **all** learners (South Africa, 1997:10; South Africa, 2001:6). If these objectives are realised, barriers to learning and development would essentially be removed.

In accordance with the international trend of providing quality education for all learners within the mainstream of education, South Africa has set a firm foot on the road towards realising this goal. It is, however, clear that within the overall international and national movement a number of groups remain vulnerable — not least children with disabilities but also those others who for a variety of reasons experience barriers to learning within existing arrangements.

During the International Special Education Congress 2000 (ISEC 2000) held in Manchester in July 2000, the following groups were identified:

- Those who are already enrolled in education but for a variety of reasons do not achieve adequately;
- Those who are not enrolled in schools but who could participate if more schools were available or were responsive to the diversity of learners in their communities;
- People with more severe impairments who have a need for some form of additional support.

During the ISEC 2000 Congress which was attended by 500

delegates from all over the world, the following realities came to light: A decade of international policy documents, such as the UN Convention on the Rights of the Child and the UNESCO's Salamanca Statement, has seen encouraging developments in many parts of the world: Developed and developing countries have accepted educational approaches that have facilitated movement towards more inclusive forms of education and intensive attempts have been made to identify the barriers to learning and development. The various international policy documents disseminated during the 1990s place considerable emphasis on the rights of all children and young people to have equal access to education. In spite of all the laudable policies, however, the operationalisation of inclusive education is hampered by many problems. Some of the most important problems that were debated and questions which arose, are the following:

- Inclusive policies have not been able to protect individual rights adequately.
- Marginalised and excluded voices are not heard.
- The way in which people with disabilities experience inclusion and exclusion in education have not been satisfactorily determined.
- Parent and community groups are not making adequate and responsible contributions to the process of inclusive education — especially in developing countries.
- The implications of changing professional roles for teacher education have not been determined.
- Ways in which special schools can promote inclusion should be utilised.
- Ways in which specialised teaching techniques can contribute to overcome barriers to learning should be utilised.
- What forms of classroom practice can respond to pupil diversity?
- Which organisational conditions foster the development of inclusive practice?
- How can pressures to exclude be overcome?
- What are the barriers to development?
- Does inclusive education benefit all children in the school?
- How do we evaluate the effectiveness of inclusive education?

The long list of problems is a clear indication of the challenges that face educators, policy makers, parents and communities in the implementation of inclusive education.

Background to the problem in South Africa

For the past six years South Africa has paid diligent attention to the following truth:

The increasing challenge to schools when they want to make a difference and they want to be fit for the future, is to examine what they are offering their learners, how it is offered and whether it meets the needs of the learners and the public (Charlton & David, 1993:3).

The new constitution emphasises respect for the rights of all, with particular emphasis on the recognition of diversity. This implies an inclusive approach to education in the sense that all learners are entitled to appropriate education in an inclusive and supportive learning environment. The new curriculum, with its outcomes-based approach is well-suited to inclusion (South Africa, 1995).