This exploratory study is concerned with the performance of Egyptian children with Down syndrome on counting and error detection tasks and investigates how these children acquire counting. Observations and interviews were carried out to collect further information about their performance in a class context. Qualitative and quantitative analysis suggested a notable deficit in counting in Egyptian children with Down syndrome with none of the children able to recite the number string up to ten or count a set of five objects correctly. They performed less well on tasks which added more load on memory. The tentative finding of this exploratory study supported previous research findings that children with Down syndrome acquire counting by rote and links this with their learning experiences.

Many studies have been conducted in different areas of Down syndrome with language taking a large part but with relatively few studies about numerical ability, especially counting. Existing research suggests that children with Down syndrome have low attainment regarding numbers, compared with their ability in reading (e.g. Nye, et al. 1997; Nye, et al. 2001). Because we use numbers in most aspects of our daily activities any difficulties with numbers may impact on our daily activities. Furthermore, counting underpins most higher levels of numerical ability. A variety of studies (e.g. Carpenter, et al. 1981; Starkey and Gelman, 1982; Baroody, 1987; Wynn, 1992; Baroody, 1996; Porter, 1999 a, 1999 b; Nye et al.2001; Bashash, et al. 2003) have shown that counting can support the development of other arithmetical activities. Young children can solve word problems or simple addition sentences by using a concrete counting strategy, also accurate object-counting experience is necessary for the development of some advanced skills (Baroody, 1987; Baroody, 1986 a, 1986 b).

Procedures first versus Principles first are the two major contrasting accounts used to explain how children acquire counting. An assumption of the Procedures first theory is that the learner is able to copy other people and reinforcement plays an important role thereby emphasising the role of experience in what the child has learnt. According to this theory, children acquire counting by learning from others or repeating the number words which they have learnt from adults. Acquisition rests, not on any innate understanding about numbers but on the feedback that they receive, and if enough of the counting procedures have been learnt the child is able to generalise and apply their knowledge to a novel task. According to this account children acquire counting procedures first before having an understanding of counting (e.g. Fuson and Hall 1983; Briars and Siegler, 1984; Fuson, 1988).

The second approach is the Principles first. Gelman and her colleagues assume that young children have an innate understanding of counting and that the very young child has an implicit understanding of number. She suggests that there is a set of five counting principles which define correct counting and young children have a primary concept of numbers consisting of these principles. Three of these principles are the one-to-one, the stable-order and the cardinality. The one-to-one principle requires each item to be counted to have a unique tag with every item in the array to have only one tag. The stable-order principle requires that the number tags to have a permanent order across counts. The cardinality principle means that the last number tag represents the total number of a set. The previous principles constitute the how-to-count principles. The remaining two principles are the order-irrelevance principle and the abstraction principle. The order-irrelevance principle means that objects can be processed in any order. The abstraction principle means that any sets of objects, a real or imagined, can be counted. According to this theory, if children know the counting principles they should detect counting errors. Furthermore, they should recognise that it is acceptable to start counting from the middle of the row or to count alternate items of the same kind and then back up to count the remaining items of another kind in a given display (e.g. Gelman and Gallistel 1978; Gelman 1982; Gelman and Cohen, 1988).

A question has been raised from the previous argument. Do children with Down syndrome acquire numbers by rote or principles? Some studies have suggested that in contrast to typically developing children, children with Down syndrome learn to count by rote. Gelman and Cohen (1988) suggest that Down syndrome children learn to count by the associative learning model. When they face a new task they are unable to benefit from hints even if these hints consist of explicit instructions or the presentation of possible solutions to solve this novel task. By contrast, the typically developing children in their study were able to generate novel solutions and to self-correct their mistakes. They benefited from subtle hints to solve a novel task they also varied their solutions according to different instructions. Their learning to count seems to be controlled by a principle model of learning. In this exploratory study, we have two broad questions:

1.1 What difficulties do children with Down syndrome in Egypt experience in learning to count?
1.2 How do children with Down syndrome acquire counting?

To investigate the type of difficulties which children with Down syndrome have in counting, a simple counting task was used. To explore how they acquire counting an error detection task was used. Additionally class observations and interviews with teachers were carried out to collect further information about their performance in counting.

Methods

Participants

Ten children with Down syndrome attending a special school in Ismailia city – Egypt took part in this exploratory study. Their
The children were classified in Egypt as having moderate learning difficulties (IQ values ranged from 50 to 74) according to Stanford-Binet measurement. Also, data was collected from ten maths teachers from the same special school.

**Procedures**

**First part: Individual work with Down syndrome children**

**Basic counting task.** The children were asked to solve three types of simple counting task.

1. Counting orally without objects. They were asked to count orally and loudly without objects from one to ten in Arabic three times. For example, the researcher asked the child to count to ten loudly and when he/she finished asked him/her again to count to ten loudly till three trials were completed.

2. Counting with objects. The child was asked to count orally-with-objects (block/s). In the first trial, the child was asked to count a set of three objects arranged in a line. In the second trial, the child was asked to count a set of four objects arranged in a line. In the third trial, the child was asked to count a set of five objects arranged in a line. The total number of trials was three.

3. The *How many* task. The child was asked to count a set of small toys and say *How many toys are there?* In the first trial, the child was asked to count a set of three objects arranged in a line and say the total number of the whole set. In the second trial, the child was asked to count a set of three objects arranged in a cluster and say *How many objects are there?* In the third trial, the child was asked to count a set of four objects arranged in a line and say *How many objects are there?* In the fourth trial, the child was asked to count a set of four objects arranged in a cluster and say the total number of the set. In the fifth trial, the child was asked to count a set of five objects arranged in a line and say *How many objects are there?* In the sixth trial, the child was asked to count a set of five objects arranged in a cluster and say the total number of the set. The total number of trials was twelve in counting with–objects (three trials in each task). The purpose of these tasks was to determine the type of errors children made and to find out if their errors formed specific patterns.

**Error detection task.** The researcher introduced herself to the children and told them that she would count but not always correctly. After this presentation, the children were then given a series of practice trials which they were instructed to watch and listen carefully to the counting trials. They were then asked *Did I get it right?* Then, a series of three trials followed to examine if the children could detect the errors which were made by the researcher. The total number of trials was three. The children were asked to detect the errors that the examiner made. In the first trial, the researcher counted correctly and she asked the child, *Did I count it right?* In the second trial, the researcher presented the child with a set of three objects arranged in a line and the counted these three objects as the following: one, two, and stopped, thus omitting the last object, and again asked the child, *Did I count it right?* In the third trial, with a set of four objects the researcher counted one, two, four, four. The children were tested individually in a separate and a quiet room in the school. Each child took two sessions to solve the previous tasks, the sessions’ period ranged between 25-30 minutes.

**Second part: Whole classroom observation**

The following data was collected by observation of the whole classroom during maths lessons. The number of lessons was ten and the period of a lesson was forty-five minutes:

1. The aim of the maths lesson which was written in the teacher’s notebook.
2. The materials and resources, which the teacher used to explain the maths lesson.
3. Whether the teacher prompted the children on counting tasks? And how?
4. The general behaviour of the target child during the maths lesson.
5. The feedback the teacher gave to the children.

**Third part: Interview with maths teachers**

The researcher used a semi-structured interview with the maths teachers of the children with Down syndrome. She asked about:

1. Their achievement in maths.
2. Their behaviour during the maths lesson.
3. Their level in maths in relation to other children with learning difficulties.
4. The language they used to answer questions.
5. Other comments which the teacher wanted to add to the above.

**Results**

**Individual work with Down syndrome children**

*Oral counting-without-objects.* Most of the children counted aloud. In 97% of the trials the number one and two were produced. In 83% of the trials numbers 1, 2, and 3 were produced. Five children counted to four without any mistakes. Three children counted to six and this was the maximum oral count number string length. Only one child used to say number 20 during her counting. All children counted by using both hands except one child who counted by using one hand, he started counting from the first finger and came back again to the same finger to complete his counting. None of the children correctly counted to 10. Regarding the length of the number string, the minimum length of number string was 1-2 and the maximum length was 1-6.

*Oral counting with-objects in a line.* Nine of the children were able to count small sets of objects (one and two objects) but if the number of objects increased, counting proficiency decreased. Six of the children counted to three. Two girls assigned the last object number
twenty, instead of three in a set of three objects or four in a set of four objects. The third trial (counting from one to five) was difficult and none of the children could complete it correctly. Some children skipped-objects during their counting. Some children gave one object three tags. Data analysis revealed that there was a difference between counting orally-without-objects and counting orally-with-objects in a row ($U=149, p>.05$) and counting orally-without-objects was easier than counting orally-with-objects.

**Cardinality rule**

The children were asked to answer the question *How many objects are there?* to investigate the children's ability regarding cardinality. The following section illustrates the cardinality results.

*In a line.* All children gave the last tag response to indicate how many objects in a set had been counted, Eight children counted to two. Four children counted to three and in 3% of the trials the number four were produced. None of the children counted whole sets correctly. Most of children had higher error rates on rows with a larger number of objects than on rows with a smaller number of objects. With regard to their responses on cardinality, 13% of the trials that the children counted were correct and six children increased the last tag according to the increased number of objects on the row, for example, 1, 3, 9 regardless of whether their counting was right or wrong.

*In a cluster.* Eight children counted to two. Two children counted a set of three objects. 3% of the trials were counted (a set of four objects) to number four. None of the children could count a set of five objects which were arranged in a cluster. Most of children made more errors in a cluster with a larger number than in a cluster with a smaller number of objects. Regarding their performance in cardinality, 7% of the trials that the children counted were right and six children increased the last number according to the increasing number of objects on the cluster, for example, 5, 9, 10 regardless of whether their counting was right or wrong. There was one female who produced the last tag response without counting regardless of the researcher's attempts to encourage her to count the objects (toys). Furthermore, all other children produced the last tag to indicate how many objects of a set had been counted. One 10 year old girl rearranged the objects both from a linear shape to a cluster shape and from a cluster shape to a linear shape. Data analysis revealed that there was a difference between counting with objects in a row and in a cluster ($t=1.81, p=.05$) and counting with objects in a row was easier than counting with objects in a cluster. The following table summarises the children's maximum and minimum length of the number string across tasks as well as their responses in cardinality. Table 1 below reveals the children's performance on the basic counting task.

### Error detectors

With regard to the errors, all children said that every trial made by the researcher was correct with no child providing evidence that they could detect the errors. The researcher made several training trials with the children before presenting the task to be sure that the children understood the task. Only one child in one trial discovered that it was wrong although he could not identify and correct the error. This was a child who was not an able counter and it could be that his answer came by chance.

#### Types of errors

The children made different types of errors. 10% of the trials were point-no word and 7% of the trials had skipped-object errors. 32% of the trials had multiple words-one point errors. Most of the children omitted some numbers during their counting, for example, they counted 1, 2, 4, 5, or they repeated the same number again such as 1, 2, 3, 3. Furthermore, some of them gave three different objects the same number for example counting 1, 1, 1 (see table 2). Another finding of this exploratory study was that the children with Down syndrome skipped-objects in counting in a cluster and double counted in counting in a row. Data analysis revealed that children with Down syndrome in this study were more likely to make multiple words-one point errors than point-no word and skipped-object errors. However, sample size and individual differences among children with Down syndrome should be put into our account when we try to interpret the data. Table 2 below illustrates the type of errors which were made by the children.

### Table 1:

<table>
<thead>
<tr>
<th>Task type</th>
<th>Max. length</th>
<th>No. of the children</th>
<th>Min. length</th>
<th>No. of the children</th>
<th>Last tag response</th>
<th>No. of the children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counting-without-objects</td>
<td>1-6</td>
<td>3</td>
<td>1-2</td>
<td>10</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Counting-with-objects in a row</td>
<td>1-3</td>
<td>6</td>
<td>1-2</td>
<td>9</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Counting-with-objects in a row</td>
<td>1-3</td>
<td>4</td>
<td>1-2</td>
<td>8</td>
<td>Wrong</td>
<td>10</td>
</tr>
<tr>
<td>Counting-with-objects in a cluster</td>
<td>1-3</td>
<td>2</td>
<td>1-2</td>
<td>8</td>
<td>Wrong</td>
<td>10</td>
</tr>
</tbody>
</table>

### Table 2:

<table>
<thead>
<tr>
<th>Categories of correspondence errors</th>
<th>Percentage of trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word-point errors:</td>
<td></td>
</tr>
<tr>
<td>Point-no word</td>
<td>$\rightarrow$</td>
</tr>
<tr>
<td>Multiple words-one point</td>
<td>6, 5 $\rightarrow$</td>
</tr>
<tr>
<td></td>
<td>4, 5, 9 $\rightarrow$</td>
</tr>
<tr>
<td>Point-object errors:</td>
<td></td>
</tr>
<tr>
<td>Object skipped</td>
<td>3 $\rightarrow$</td>
</tr>
<tr>
<td></td>
<td>4 $\rightarrow$</td>
</tr>
<tr>
<td></td>
<td>7%</td>
</tr>
</tbody>
</table>
Variation within children

There was a wide variation in abilities within this group of children with Down syndrome. For example, some children rearranged the objects and others did not. Some but not all made skipped-object errors. In addition, some of them counted by using only one hand during their counting while others used both. There appeared to be no specific pattern of errors in relation to age in this sample of children with Down syndrome.

Whole class observation

The classrooms consisted of approximately twenty desks with the walls covered with displays providing an explanation of some lessons. There was a table and a chair for the teacher in the front. All the children were sitting at their desks during the lesson facing the teacher in rows. The total number of the children ranged from twenty to twenty-five. Every child had their own book for maths.

1) Year 3

The child was asked to count to ten. She made some mistakes in her counting as well as she counted slowly. For example, she started to count from number 1 to 6, after 6 she said 20 and did not say 7-8-9-10. The aim of the maths lesson was to teach the numbers and the students how to write these numbers (including the children with Down syndrome). The teacher prompted them in counting by verbal reinforcement (such as: good boy, well done etc). The teacher used some multimedia such as cards, abacuses and pictures. The teacher provided some models and examples during her explanation of the lesson. The pupil with Down syndrome was calm and the teacher gave her feedback and corrected the mistakes of the child. These findings are consistent with the findings of individual work with the child that she could not count correctly from one to ten. She made several mistakes during their counting such as missing numbers.

2) Year 4:

The aim of this maths lesson was to learn reading and writing numbers. The content of the lesson was to count from 1 to 5 and the pupil made many mistakes during her counting; she forgot some numbers (e.g. she said 1-2-3-5). Her teacher prompted her on the counting task by verbal reinforcement (e.g. good girl, well done or excellent). The teacher used the blackboard, cards and blocks. The pupil was calm and polite and the teacher gave feedback on her mistakes.

3) Year 6:

The aim of the maths lesson was how to count forwards from 1 to 10 and backwards from 10 to 1. The child counted slowly with some mistakes (e.g. 1,2,3,4,6,9,10 and 10,7,5,3,2,1). His teacher encouraged him with rewards. The teacher used cards, blocks, boards, and pictures. The pupil was calm and polite, and the teacher gave feedback on his mistakes. The teacher gave models and examples during her explanation of the tasks. As the child with Down syndrome was not able to produce a complete number string from one to ten, he was not able to count forwards and backwards despite his teacher’s efforts to encourage him.

4) Manual education level A:

The child tried to multiply some numbers, which was the aim of the maths lesson. He recognised the numbers but he made some mistakes during the multiplication process. For instance, when he tried to multiply 2 × 5, he said twenty. The teacher prompted the child by showing him the solution of the problem and asked him to do it again. The teacher used cards and abacuses as aids in her explanation process. The teacher illustrated the lesson with some examples but the student did not pay attention to his teacher. The teacher gave the child feedback on his mistakes.

5) Manual education level B:

Again the aim of the lesson was to teach the pupil simple multiplying process. The child could not solve a simple multiplication problem. The teacher used boards to explain the lesson. The pupil was calm and she paid attention to the lesson. The teacher gave examples and feedback to the children. Individual work with the child revealed that she has some difficulties in producing a correct number string. She was not able to count forwards from one to ten, so it is unsurprising that she could not do simple multiplication process.

In addition to the previous findings, most of the children who were observed had difficulty in controlling the rules of grammar and syntax. They could communicate with other children and with their teachers but the grammar was not perfectly correct. There was a wide range of individual differences between those children and the other children with learning difficulties. They had less vocabulary than other children with learning difficulties. When the researcher asked them to do something, she noticed that they did it but if she asked them to explain it, they could not explain it well. She also observed that they had a problem in their speech production. It appeared in class that they could understand the information well if their teacher represented it by visual methods. Also, if their teacher asked them to answer any questions by pointing, their answer was better than if he/she asked them to say the answer by speech. In addition, some of them paused for a while to answer a simple question such as, Which year are you in?

Results of interviews with maths teachers

Regarding the maths teachers’ opinions about children with Down syndrome, the interview findings revealed that they have a positive opinion of children’s behaviour. They saw the children with Down syndrome as quiet, polite, and cheerful. In contrast they expressed
Some teachers discussed the role of the parents in supporting their children at home. They said most parents put their children in the school purposefully for the whole week to avoid the responsibility of being with them but a few parents gave their children more time to support them in maths and other subjects. The teachers said that most of the effort is on their behalf, in every session there is only one teacher working with about 20 to 25 children at the same time. They attributed the deficiency in language to poor vocabulary because of the deficiency in Arabic lessons. Some teachers said that children with Down syndrome could not communicate probably because they have a lower IQ than other children. Most of the teachers confirmed that the children respond well after any negative or positive reinforcement. However, the teachers concluded that they need more support and more financial resources to improve the quality of the education of these children.

Discussion

The aim of this exploratory study was to determine the difficulties that Egyptian children with Down syndrome encounter during their counting. Quantitative and qualitative data analysis revealed that these children experienced a number of difficulties in counting: only six children could recite a number string of one to six and no child could count correctly to ten, six children could correctly count three objects but no child could count five, they made many errors during counting the most frequent being to give multiple words to one point. These findings largely concur with the majority of the relevant literature (e.g. Casey et al. 1988; Shepperdson, 1994; Hanrahan and Newman, 1996; Porter, 1999 a, 1999 b, Nye, et al. 2001), albeit with some differences.

Like the study of McEvoy and McConkey (1991) of children with moderate learning difficulties they could rorate count and it is the best of their counting performances. Quantitative analysis revealed the same finding that the children with Down syndrome, in this study, could count by rote better than counting with objects. Furthermore, with regard to the difficulty of the task, counting orally-with-objects was more difficult than counting orally-without-objects and counting on a row was easier than counting in a cluster. Children performed better in counting with objects in a line without answering the How many? question than in a line when they were asked to give the last tag response. These findings concurred with the findings of Wilkinson's study with preschool children, (1984) that count-hard (in hard arrays, objects were arranged in an irregular pattern) was more difficult than count-easy, count-easy (easy set was arranged in linear arrays) was more difficult than recite (the child asked to say the number names in order while the investigator pointed to the items in a hard array) and count hard was more difficult than point-hard (using hard set and the child asked to point to each items without saying any numbers). Also, the findings coincide with Towse and Hitch's (1996) findings that young children (primary school children) found some difficulty in counting random arrays. They made more errors on random arrays than on rows.

One explanation of these findings is shown by Gelman and Gallistel's (1978) work with preschool children, that the skill of producing an oral count and pointing to each object in an array may be relatively difficult. However, the difficulty of a counting task increased according to the number of cognitive mechanisms that the task required (Wilkinson, 1984). Furthermore, counting random arrays requires sufficient working memory to remember which objects have been counted, an area in which research has indicated that children with Down syndrome have a deficit (Marcell, & Armstrong 1982; Marcell & Weeks, 1988; Hulme and Mackenzie, 1992; Carlesimo, Marotta, & Vicari, 1997; Jarrold, & Baddeley, 1997) so they appear to have difficulty in remembering which items have been counted.

The findings of this exploratory study coincide with Fuson's findings (1988) that the kinds of correspondence errors increase in disorganised arrays rather than in linear arrays. Object skipped errors, object recounted and object never counted, which were made by the preschool children, increased in the disorganised arrays rather than in linear arrays. In addition, when the objects were arranged in a circular loop, the children performed poorly on this counting task and their errors increased. Fuson (1988) points out that children might know the stop-rule but not be able to use it and forget the starting point and start to count the same objects again. Again an explanation lies with the role of memory.

Children's errors increased according to the length of a row or a cluster. Children made skipped-objects in counting a cluster and double count errors in counting a row a finding supporting Wilkinson's (1984) claim that when pointing happened, children made double pointing errors in counting-easy and skipping points in count-hard. Data analysis revealed that children with Down syndrome, in this study, were more likely to make multiple words-one point errors than point-no word and skipped-object errors. This finding contradicts with Porter's (1999 a) findings. She found that pupils with Down syndrome who made one-one errors were more likely to miss numbers (skipped-objects) than to double count.

There are some explanations of this contradiction, firstly, the small sample. Secondly, the individual variations among those children. Anyhow, sample size and individual differences among children with Down syndrome should be put into our account when we try to interpret the data. Thirdly, children with Down syndrome in this study have learnt maths by Arabic language methods and the rules of Arabic language are different from English language rules hence the effect of this difference may hinder producing some types of errors such as skipped-object errors or facilitate producing another type of error such as multiple words-one point errors. This claim needs more investigation.

Regarding the cardinality rule, although all children with Down syndrome in this study used the last tag to indicate how many objects of a set had been counted, this does not mean that the children have an understanding of cardinality. Fuson (1988) argues that typically developing children could give the last tag response without having understanding of cardinality. Only a minority answered the How many? question correctly (10% of trials) due to counting errors.
The most obvious finding of this exploratory study was that none of the children were able to detect any type of errors which were made by the researcher. Porter’s (1999 a) sample of children with Down syndrome showed different responses on the error detection task, some of them demonstrated some understanding of the error detection task while others could detect cardinality errors and one pupil was able to detect all types of errors. There are some possible explanations of this contradiction that her sample was more advanced in counting number strings because they were able to count from one to ten but this sample could not. Another explanation is due to the methodology. Porter used a puppet in her study to present the error detection task but in this study the investigator presented the task herself. So, the children in this exploratory study might deal with the investigator as their teacher and think that their teacher never gets anything wrong. They might consequently say, right to all the trials that the investigator made due to this thought.

The linguistic output of children with Down syndrome seems to be less mature than that of both children with other aetiologies and those who are typically developing children. There is a delay in children with Down syndrome in productive speech abilities and there is a problem specifically related to expressive language rather than to comprehension (Jenkins, 1993; Messer and Hasan, 1994). So, this deficit in language may be another reason which underlies the deficit in their counting. Another related explanation of this deficit in counting of children with Down syndrome is the approaches which were used to teach maths to these children.

In light of the above, the exploratory study findings suggest that children with Down syndrome, in this study, have deficits in carrying out procedures of counting as well as having a limited understanding of rules. The evidence of the previous conclusion was yielded from their performance on a basic and an error detection task. They were not able to count to ten, made errors during their counting, found counting sets of objects arranged in a cluster shape more difficult than counting when objects were arranged in a row and could not give the last tag response correctly. Quantitative and qualitative data analysis suggests that Egyptian children with Down syndrome, in this study, acquire counting by rote and this finding supports the procedures first account. Elsewhere it has been argued that the process of acquiring the skills and understanding is a gradual one with children's emerging understanding being initially confined to a series of rules which operate largely independently (Porter 1996). Children in this sample demonstrated limited understanding of those rules and to account for this we must also look at their learning environment.

Observations revealed the extent to which the content of the lessons were consistent with the children's abilities with children being called on to respond to tasks that were in advance of their skills and understanding. The progressive nature of mathematics make whole class teaching problematic where the child has not acquired the foundation from which to build, and who has notably poorer skills than their peer group. In this context, despite well meaning teachers, it is unsurprising that children experience difficulties, nor that we conclude that the learning that has been acquired is of a largely rote nature.

Research on language stresses using visual resources to teach words for children with Down syndrome (Buckley, 1993 a, b; Bird and Buckley, 1994). Gibson, (1996) points to the benefits of using visual modality in teaching children with Down syndrome as the following:

Visual cognitive encoding is superior to auditory cognitive encoding; compared with mental handicap peers. (p. 162)

Even, visual presentation may aid the children with Down syndrome to learn number strings and to learn more effectively if the information is presented through different channels such as visual, auditory and tactile channels (Hanrahan and Newman, 1996). However, using visual modality in teaching maths for Egyptian children with Down syndrome still has a low priority. Some teachers used some visual presentation during the maths lesson, although it is unclear whether they knew why.

Conclusion

The purpose of this study was to start to explore the strengths and weaknesses in the performance of Egyptian children with Down syndrome in counting and how these children acquire counting, through collecting broad data and information about these children and their learning. The main finding of the exploratory study was to illustrate the difficulties children experienced in counting and to raise possible explanations which, given the size of the sample must be tentative especially where they depart from other research. The results were largely consistent with an account that recognizes difficulties in relation to the number of cognitive component of the counting task. Inevitably this information processing approach highlights the role of memory in learning to count. Although there was variability in children's attainments, there was limited evidence of children having acquired the rules for counting. It could be argued that the learning environment with an emphasis throughout on whole class teaching compounded these difficulties, especially as children's performance was lower than their peers. The challenge in these circumstances is for teachers to meet the needs of a diverse group of children who experience difficulties in learning.

References


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