

Development of a Scissors Skills Programme for Grade 0 Children in South Africa – A Pilot Study

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ABSTRACT

The need for a scissors skills programme was identified due to the varying levels of these skills found in Grade 0 children in South Africa. Essential elements for the development of the programme were identified using activity analysis and by evaluating five commercially available programmes in terms of programme length, grading of practice and picture components, type and thickness of lines and the use of a skills checklist. A South African Scissors Skills Programme (SASSP) was compiled based on the skill level of Grade 0 children. Content validity was assessed through expert opinion of the programme and construct validity was assessed in a pilot study carried out on 10 Grade 0 children. Changes made to increase the validity of the programme included picture selection as well as the grading and type of lines used. The teacher instructions for presenting the programme were altered to be easily understandable. The programme was finalised for implementation in further research.

Key words: Bilateral fine motor skills, Scissors skills programme, Graded programme, Grade 0 children

Introduction

South Africa is a country of diversity with different cultures and languages, socio-economic levels, educational levels and health issues. Children are affected by their birth history and environ-

ment. This includes parenting, health, as well as care leading up to the pre-school years. Children's development, and hence school readiness, is dependent on the interaction of genetics, maturation, and engagement with their environment¹. The Grade 0 year is an



important part of a child's development as it is considered the year in which a child becomes 'school ready'. This term describes a child's development, not only emotionally and socially, but also physically in terms of their fine and gross motor co-ordination and cognitively in relation to their ability to face the challenges of formal schooling and benefit from them². Formal schooling is built on a continuum of learning once the child enters Grade 1, when they learn to read, write and do mathematics.

In order to establish if a child is 'school ready' many school-readiness tests available both in South Africa³ and on the internet are used⁴. These tests emphasise the importance of the development of the skills required as a prerequisite to entering Grade 1. A large number of the items in these tests include aspects of fine motor skills which make up part of dressing such as fastening buttons and tying shoelaces as well as other skills like holding a pencil, colouring, cutting with scissors and name writing.

These assessments are in line with the time allocated to fine motor tasks in the pre-primary classroom, which according to McHale and Cermak⁵ accounts for 30% to 60% of all activities, of which handwriting is the most predominant task. Other fine motor tasks include cutting with scissors and using a computer keyboard. In Grade 1 the classroom time spent doing fine motor activities increases to between 60% and 70%. This emphasis on fine motor skills provides each child with opportunities to exercise the small muscles of the body in the critical period for fine motor control development, which is believed to start around age two and begin to wane at about age ten. This critical period represents a window of opportunity during which children are maximally sensitive and responsive to certain input. It is during this time that the neural pathways, area of the brain and also skill have the maximum potential for development¹.

Internationally it has been shown that approximately 12 % of children experience difficulties with manual dexterity and lack the opportunity to develop the motor learning required for the specific fine motor skills needed to perform in the classroom. If this deficit is not rectified at an appropriate age, the lack of skill has a greater and greater impact as the child gets older, because activities become more complex and new motor learning is dependent on consolidation of previously learnt skills⁶. These children fall behind and fail to achieve with later social, vocational, academic and psychological or emotional consequences^{7,8}.

In South Africa research has shown that over 50% of children attending a non fee paying urban school in a low socioeconomic area had significantly worse scissors skills than children who attended fee paying or private schools⁹. This is supported in a study that indicated that the manual dexterity of children (6-17 years) differs depending on the child's socio-economic circumstances¹⁰. Children from middle class areas perform significantly better than those from the poor areas. Children from low socio-economic environments are least likely to have been exposed to tools like scissors and therefore these children would not have been able to develop fine motor skills at an appropriate age¹⁰.

The first step in designing and developing programmes as described by Fraser and Galinsky¹¹ is to identify the population at risk as well as the need for an intervention, in this case fine motor skills in preschool children in South Africa^{12,13}. There is evidence that early intervention can result in rapid improvement of these skills⁹. Occupational therapists in particular are in a position to guide this intervention, because of their understanding of milestones in development and their ability to analyse activities. They are thus aware of the effects of inadequate stimulation and lack of resources in the environment and how these factors can affect a child's ability through disruption of basic neural circuitry¹⁴. The use of stimulation including activity programmes, which target specific motor skills to promote a child's development, form the basis of the approach used by the occupational therapist in this situation⁶.

Review of the literature

The literature indicates that after the first year of life, in which development is programmed, variability increases and behaviour

becomes more complex¹⁵. Thus once basic milestones have been reached, the child requires exposure to tasks and activities in order to achieve mature patterns or learn new motor patterns. This means that children need to be stimulated and facilitated in their learning.

Theories established in the 1960's and 1970's still form the basis of understanding motor development and according to Cratty¹⁶ the development of gross motor skills seems to be more dependent on maturation, whereas the development of fine motor skills after infancy is mainly determined through learning and practice. This theory is supported by McClenaghan and Gallahue¹⁷ who describe initial motor patterns like running and catching as fundamental motor patterns, with the refinement of these patterns into sports skills being based on individual motor learning, resulting in different mature movement patterns. Motor learning occurs on an individual basis and by the time the children are at school going age, their skills vary vastly because of differences in environmental opportunities, familial and cultural influences, personal experiences, and genetic endowment^{8,18}.

Children should be evaluated in terms of their motor skills to determine what deficits need to be addressed during the pre primary Grade 0 year. Occupational therapists' knowledge of activities allows them to intervene at the correct level to facilitate the development of fine motor skill performance, eliminating delays or deficits in children when they are young, by exposing them to age appropriate specific tasks that allow for practice¹⁸. This is irrespective of their background and the opportunities they have had. Each motor skill should be considered for its developmental appropriateness when introducing it to a child^{14,19}. Each activity used to practise the motor skill must be analysed in order to understand the underlying performance components such as co-ordination, strength, bilateral integration and postural stability needed to achieve success in carrying out the age appropriate tasks making up the skill. Specific motor skills are learnt over time and are influenced by practice as well as the complexity of the activity involved. These factors determine when the consolidation of a given skill occurs¹⁶.

Generally the literature agrees that scissors skills develop by initially learning to hold scissors then by starting to snip and finally by cutting a straight line^{20,21}. The Peabody Developmental Motor Scales²² outline age based tasks or skill in terms of cutting with scissors according to norms, which include the ability to snip with scissors by two years. Children can cut across a 15 cm piece of paper at two and a half years. By three to three and a half years they should be able to cut on a line that is 15 cm long and at four years they can cut out a circle. From four and half to five years they can cut out a square²². Variation of later skill development in terms of the order of shapes cut, accuracy and speed is reported by Schenk¹⁹. Competency in scissors skills should be developed by the time children are six to seven years old and are entering Grade 1²³. This competency is necessary for cutting accurately with scissors so that the child is prepared for the classroom requirements they will face. Adequate ability in this skill will assist them to take part in scissors skill tasks in the classroom.

Scissors skills can also be considered as a precursor to pre-writing skills, used to prepare the child to hold a pencil and form letters. The same muscle groups are used in both activities with the tripod fingers (thumb, index and middle fingers) carrying out the skilled movements while the ring and little fingers provide stability²³.

Effective performance of fine motor skills in class allows future learning to be a positive experience, supporting the social and emotional aspects of coping at school²⁴. It is important therefore that the skills of children are facilitated in Grade 0 so that they can perform at similar levels when entering Grade 1, rather than being disadvantaged by lack of resources and exposure and having to overcome the delay in their skill development in order to complete basic task requirements once they are in formal education¹⁸.

Purpose of the Study

The purpose of this study was to develop an intervention programme for the development of scissors skills in Grade 0 children from various backgrounds, who may be at risk in terms of fine



motor development. Since South African children come into to grade 0 with a variety of different exposures and experiences, it was important to make the programme broad, in order to allow for participation of all children, irrespective of previous experiences.

The **first objective** in the development of the programme therefore was to construct a graded programme that would allow children, irrespective of their ability, to move on a continuum of development from the beginner to the highly skilled performer⁶. This would include repetition of a familiar skill for some of the children, while for others it would be a completely new task. The programme, therefore, aimed to facilitate the scissors skills of children in Grade 0 with and without developmental delay, who did not have any identified or diagnosed learning problems. The programme was based on the normal developmental sequence of scissors skills and was designed to be presented in the classroom as part of the teaching programme.

The **second objective** was to design a programme that would facilitate the development of scissors skills to a point from where all children would achieve an acceptable level of skill while in Grade 0, irrespective of their skill at the start of the programme⁶.

Research Design and Methods

The **second step** in programme development according to Fraser and Galinsky¹¹ places emphasis on the use of programme theory in designing intervention programmes. This research, therefore, underwent the different stages of this step:

- ❖ developing the first draft of a programme by specifying essential programme elements and establishing fidelity criteria and face validity,
- ❖ submitting it for expert review to confirm content validity and then
- ❖ field testing the programme in a pilot study to establish construct validity and
- ❖ finally adjusting the programme so that teachers can be trained in its use¹¹.

1. Developing the first draft South African Scissors Skills Programme (SASSP) and the specification of essential programme elements and face validity

The draft South African Scissors Skills Programme (SASSP) was developed using activity analysis and through a review of commercially available programmes, application of activity analysis and motor skill theory as well as taking the interests of five to six year old children into account. Elements or components which are important for a scissors skill programme were consequently developed. The analysis of existing programmes was done according to these identified elements or components. Five commercially available programmes^{25,26,27,28,29} were reviewed. Three of the programmes were designed by occupational therapists and the other two were for use in special education. This process also served to establish the face validity of the programme.

2. Establishing content validity

The content validity of the programme was established through a pilot study using the opinion of expert occupational therapists

Table 1: Properties of pictures selected for the validation pilot study.

Picture	Practice
House: 7 changes in direction with at most a 90 degree corner	Straight line with 2x 3mm; 6x 2mm
Plane: 16 changes in direction	Straight line with 4x 2mm and 4x 1mm lines
Train: 26 changes in direction	Straight line with 2x 3mm and 6x 2mm lines
Crocodile: 46 changes in direction	Square spiral decreasing from 3mm to 1mm lines
Apple: rounded shape with 8 corners and some straight lines	Circle 3mm line
Snake: spiral shape	Circle 2mm line
Earth: circle	Circle 1mm line
Wheel: circle	Circle 1mm line

in the paediatric field as content validity is dependent on the assurance that there was an adequate coverage of the field, in this case scissors skills³⁰. A sample of 12 experienced occupational therapists, who had at least eight years' experience in the paediatric field and who were considered experts in motor skill intervention in pre- primary school children, were selected using convenience and purposive sampling.

A focus group was held during which the therapists evaluated the 50 worksheets of the SASSP. Discussion focused on practice items, picture selection, grading, line thickness as well as the length of the programme. The comments of the therapists that were made during the focus group were transcribed and were used to adjust the SASSP and complete the final version of the programme.

3. Construct validity

Construct validity should demonstrate that a programme addresses the constructs or skill that it proposes to develop. Items in the SASSP were field tested in a pilot study with a group of 10 five to six year old Grade 0 children, to determine the validity of the grading and sequence of the practice components and picture selection as well as to investigate possible problems with the teachers' instructions. The purpose here was to judge an accumulation of evidence gathered by field testing the SASSP³¹ through evaluating the implementation and the appropriateness of the worksheets. Whether the teacher could deliver the program, whether the sequencing of content and activities were congruent with the Grade 0 children's ability and interests and whether the child seemed to engage in the task was also evaluated.

Eight pictures were chosen for the evaluation of the SASSP as these allowed for inclusion of varying line direction, shape and line thickness. These eight pictures represented a wide variety of cutting tasks required to complete the SASSP and presented enough range in ability to gain insight into the level of difficulty of the programme and its' appropriateness for Grade 0 children. Table 1 presents the selection of the pictures chosen for validation of the content of the programme by the researcher using the criteria on a checklist set for line thickness and type, change of direction and type of picture (see Table 1).

A pre-primary school was selected by convenience sampling, as it included a mixed population in terms of gender, socio-economic backgrounds and cultures. Some of these children had previously attended a nursery school, whereas others started their school career in Grade 0. The principal of the school randomly selected 12 participants from the four Grade 0 classes. Ten participants whose parents signed consent participated in the pilot study.

The principal of the pre primary school used the eight pictures and the teacher instruction sheet to carry out the pilot study with the 10 participants over a period of eight school days. The principal at this school was also one of the class teachers and she wanted to do this pilot study herself, as she felt that it would be less disruptive to the school day. Paper and scissors were provided to control for variation in the materials and equipment.

The programme was evaluated in terms of the skill of cutting, and appropriateness of the level of difficulty for the five to six year old age group, as well as the effect that the practice and the pictures had on the children's motivation to participate.



Results

Developing the first draft SASSP

The following five elements were identified as essential for the program: the length of the programme, the number and type of picture, the line type and thickness, the inclusion of a practice component and grading. The use of a check list was also considered. The five programmes were therefore evaluated against these criteria.

1. The length of the programme – the programme needs to be long enough to develop and consolidate a skill. A skill such as cutting, which is a complex bilateral task, will need more practice, than for instance threading, a slightly easier bilateral task²³. The length of a scissors skill programme has not been researched, however eight activity pages (as used by one of the reviewed programmes) was deemed to be insufficient. The programmes reviewed varied between 8 activity pages and 343 pages with differing numbers of pictures (see *Table II*). The amount of time required to complete the different programmes was not specified.

As a result the SASSP was designed to be completed within the classroom over a time period of 10 weeks, so that changes in the children's cutting ability at the completion of the scissors skills programme could be attributed to the programme, rather than 'motor maturation' or participation in a general class routine. This was important as the changes measured need to be linked to the intervention for generalisation to a larger population. The programme was therefore limited to 50 worksheets, which it was estimated would allow enough practice for children to develop adequate skill.

2. The number and type of picture used - When children are motivated, they are eager to participate and to put effort into the activity. Thus presenting appealing pictures is very important²³. It is often not realistic to have designs with corners and circles only, but rather a combination of corners and curves, as one would see in an animal picture (*Table III*). In the five programmes the number and type of pictures varied from eight to approx 60 pictures. Those that were of suitable length had a poor variety of pictures as they contain only shapes, one type of theme in the pictures or repeated pictures.

Pictures for the SASSP were chosen by looking at many children's books, as well as games with clear line drawings. Selection was made according to those that South African children could

relate to. For example, the South African flag was used, as well as animals such as a lion or farm animals found in this country.

3. Line type and thickness used in the pictures - straight-line designs are easier to cut out than complicated curved designs with a lot of detail¹². Although pictures are not as easy to grade as lines, curves and corners as their elements cannot be separated, there is still a general trend to grade from straight line pictures to complex designs. Only one programme graded the line type from straight to curved lines with all the others presenting no clear progression from straight lines to curves and sharp corners allowing a change of direction and finally a circle¹² (see *Table IV*).

Line thickness is also an essential element, as thicker lines allow the child to stay on the line and thus developing the skill of cutting on a line. This needs to be the 'just right' challenge. A line, for instance, that is too wide, allows for much fluctuation when cutting, rather than gently guiding children into cutting along a more narrow path²⁶. Correct visual feedback when maintaining the scissors on the line reinforces the development of this skill. The skilled person is able to anticipate potential mistakes correcting them if necessary when the line is thick enough to allow for correction of movement⁸.

It is easier for a child to cut on a thick line (3mm), as the path is wider and thus allows for some fluctuation in scissors control. A thinner line (1 mm) requires the child to control the scissors more accurately. In the SASSP a 3 mm line was used as a starting point, rather than 6 mm or more as in the reviewed programmes, as this thickness was appropriate for the skill level of five to six year olds¹².

A graphic artist drew the pictures on a computer and adapted the line thickness within the various drawings as required to grade the programme.

4. Inclusion of a practice component and grading – A practice section reinforces a skill that needs to be learned and a practice section would facilitate cutting on a specific type of line²³. Further, a practice section can facilitate cutting out a specific shape, reinforcing only that skill, whereas this is not possible when cutting out a picture that generally has a combination of shapes. The practice section can be used to introduce cutting various shapes. As this is not limited to pictures, it is easier to control and also easier to grade from straight lines, to corners, to curves. Corners can further be graded from large angles to smaller angles, requiring more manipulation of the paper¹². The task is thus graded from simple to complex²⁶. When changing

Table II: Review of programme length of five scissors skills programmes

Name	Scissors Skill ²⁵	Learn to Cut ²⁶	Developing Basic Scissors Skills ²⁷	Cutting Activities ²⁸	Shapes to Cut ²⁹
Programme length	This programme has 60 picture pages.	This is a comprehensive cutting programme (343 pages), with 61 individual art projects- too long – over a year of practice ^{16,34} .	This programme has eight activity pages.- too short to reach autonomous phase of scissors skill ^{16,34}	This programme consists of 40 pictures.	This booklet includes 28 pictures.

Table III: Review of the pictures used in the five scissors skills programmes

Name	Scissors Skill ²⁵	Learn to Cut ²⁶	Developing Basic Scissors Skills ²⁷	Cutting Activities ²⁸	Shapes to Cut ²⁹
Pictures	Pictures are grouped into seasonal pictures. 5-6 are allocated per month. The educators are therefore able to use them in themes discussed in the class. Pictures do not allow a programme of daily practice.	The pictures focus mainly on the shapes practiced, rather than combined patterns (e.g. no animals) and provide no motivation in terms of content and visual appeal.	There are only eight pictures that can be cut out, half of which are greeting cards. Too few pictures for a cutting programme with poor variety.	Appealing pictures and projects have been included, however, some themes are repeated and pictures are very similar. There is lack of variety and pictures become repetitious.	Only animal pictures are used as they are very appealing for children. No variety in terms of different types of subject matter.



Table IV: Review of line type and thickness in the pictures in the five scissors skills programmes

Name	Scissors Skill ²⁵	Learn to Cut ²⁶	Developing Basic Scissors Skills ²⁷	Cutting Activities ²⁸	Shapes to Cut ²⁹
Line type in pictures	The programme overall is not graded from straight lines, to corners to curves.	Pictures are not graded in terms of level of difficulty with a mixture of complex shapes with corners and straight lines.	The picture pages are graded from straight lines to curves.	The pictures are not graded at all; they vary from straight lines, to curves and circles.	Generally pictures have round corners and gentle angles for cutting. The change of direction, as in sharp angles is ignored.
Line thickness	All of the pictures have a line thickness of 1,5 to 2mm.		The picture pages have very thin lines (less than 0,5mm) and there is no grading for the line thickness.	In the programme, the line thickness is constant at less than 0,5 mm, which could be viewed as an outcome, rather than a starting point with five to six year olds.	There is no grading from one picture to the next. Each picture in itself has varying line thickness. However, this varies from 1 mm to 3 cm or more, which is a very wide range.

from one pattern to the next, i.e. where the pattern becomes more complex, the overall difficulty can be made easier by increasing the line thickness¹². The change from one thickness to the next should be slowly graded²⁹. Cutting should be taught using a solid line because cutting on a dotted line is a more complex perceptual task. The child

has to incorporate the perceptual component of visual closure when the line is not solid, which is not inherent in the cutting skill²⁶. Two of the programmes reviewed did not have a practice component and none contained all the elements mentioned for successful practice sessions (see Table V).

Table V: Review of practice opportunities and grading in the five scissors skills programmes

Name	Scissors Skill ²⁵	Learn to Cut ²⁶	Developing Basic Scissors Skills ²⁷	Cutting Activities ²⁸	Shapes to Cut ²⁹
Practice	There are seven practice pages, which include a wide variety of lines to be cut out including straight lines, angles and also curves.		There are seven practice pages.	There is no practice sections at all.	The booklet has no practice sections.
Practice Grading	The practice lines do not vary, thus the same lines are practiced with each corresponding picture page.	The practice pages are graded from snipping, to cutting a straight line, to cutting a simple shape, to cutting a complex shape. The shapes are graded in terms of their level of difficulty i.e. squares, rectangles, triangles and diamonds are done before circle, oval, crescent, heart and star.	The practice pages are graded from straight lines, to lines with corners, to curves, to circles and to ovals. There are only seven variations in the practice of cutting skills.	N/A	N/A
Line thickness	The straight line starts with a 3 mm line thickness. All other practice lines are between 1 and 2 mm.	The line thickness decreases from 6mm to 2-3mm. The 6mm line thickness is used every time a new practice is introduced and it decreases as the same practice is repeated.	The line thickness decreases from 1,7 cm to 3mm.	N/A	N/A
Line type	Two of the practice lines have dotted lines, as opposed to solid lines.	All of these pictures have dotted lines for cutting (width 2mm and some 1mm).		Dotted lines are used.	



After the review of existing programmes as well as motor learning³², it was decided that the SASSP should have a practice component as well as a picture component. The practice and picture components were linked in terms of difficulty (see Figure 1 for a sample of a programme sheet).

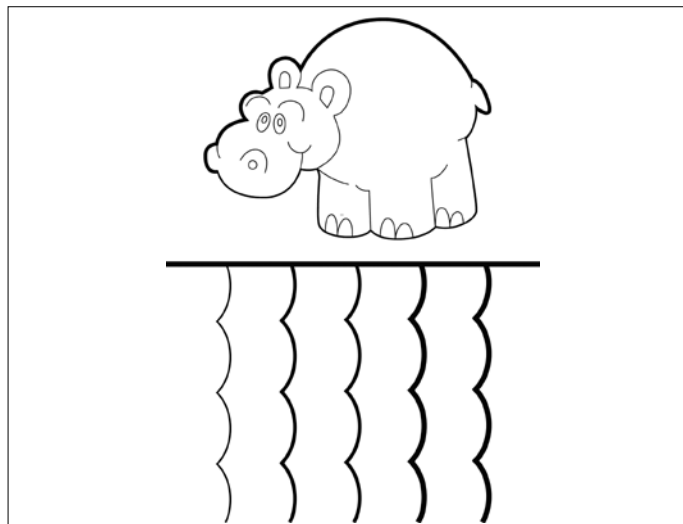


Figure 1: Sample of a programme sheet including a practice and picture component with different line thicknesses

Each of the 50 worksheets of the SASSP was divided by a line in the middle with a picture component at the top and a practice component below. Each worksheet would be cut on this line, to divide it into two A5 pieces. The practice design would always be cut out first, followed by the picture. The practice component was designed to contain repetitive patterns and was thus not as interesting to cut out. Cutting out the picture would, therefore, be the 'reward' once the practice sheet was completed (see Table VI for the grading criteria).

Table VI: Grading criteria for the practice and picture components

Grading of the Practice Component	Grading of the Picture Component
1. Straight lines	1 Straight line pictures with few changes in direction and also easy corners. (e.g. 90 degree corner is easier to cut than a 25 degree corner)
2. Zigzags (130 degree)	2 Straight line designs with many changes in direction.
3. Square spiral (90 degree)	3 Pictures with gentle curves
4. Zigzags (70 degree)	4 Pictures with prominent curves
5. Frog-jumps	5 Pictures with circular parts present
6. Gentle wide wave	6 Pictures with many changes in direction
7. Top straight line with bottom circles cut out	7 Pictures with more detail (complex designs)
8. High waves	8 Straight line pictures with few changes in direction and also easy corners. (e.g. 90 degree corner is easier to cut than a 25 degree corner)
9. Top and bottom circles joined in a pattern	9 Straight line designs with many changes in direction.
10. Spirals	10 Pictures with gentle curves
11. Circles	11 Pictures with prominent curves

In contrast to the commercially available programmes, in which the practice lines were presented in the middle of a blank page, each practice design in the SASSP started at the edge of the paper, to guide and teach the child where and how to start a cutting task. This was to aid in the development of the correct approach to a cutting a line as children who have not used scissors before often struggle to cut towards a shape or line in order to cut it. These children often cut strips off the paper in order to approach the shape and only then cut on the line. The lines on the practice sheets in the SASSP therefore provided the correct approach to the paper, allowing the execution of this aspect of the scissor skill correctly and efficiently.

When designing the practice component of the SASSP, a previous study on 167 four to six-year old children from varying socio-

economic backgrounds, which indicated that these children were initially best able to cut on a straight line, was taken into account¹². Ability to cut around a corner (square and triangle), a semi-circle, a crown, a spiral and lastly a circle then developed sequentially¹². The practice component of the SASSP was, therefore, graded according to these criteria.

The picture designs were graded in a similar way to the practice component and were matched in terms of difficulty. Generally, pictures did not consist of one element like straight lines or circles only and consisted of a mixture of these lines which were thus graded according to the angles of corners, as well as the frequency of corners versus curves.

In the SASSP grading was also introduced with respect to line thickness, which ranged from 3 mm to 2 mm and finally 1 mm. However, a programme that teaches and allows practice of scissors skills on a 3 mm line alone does not adequately prepare children for the outcome required in Grade 1 and is not reflective of the ability of Grade 0 children. The pictures and ruled pencil lines that Grade 1 children cut out in class are generally 1 mm or less. Thus the outcome for cutting on a line in Grade 0 had to be set at a line of 1 mm width.

Each group of practice designs in the program therefore started with a 3 mm line thickness, decreased to 2 mm and then 1 mm. Each time a new type of line was introduced the line thickness increased to 3 mm for a few practice sheets and then decreased to 1 mm within the next few. Thus, as the complexity of the design increased, the line thickness was initially increased in order to simplify the task and allow the child to learn the more complex skill without getting frustrated by the need for accuracy on thinner lines.

Within the picture component of the SASSP, the line thickness was varied, so that at some point of the drawing the line thickness was 3 mm and at another it was 2 mm or 1 mm. This varied according to the actual picture and complex parts of the pictures were made easier by increasing the line thickness, to accommodate the difficulty of the task.

5. Inclusion of a skills checklist - a checklist helps to keep track of children and their skill development²⁶. However, in a class where there are many children, this can become an overwhelming task if too much administration and detail is required for the situation in which the SASSP would be used. Three of the programmes included a check list of some sort but none of them included instructions for use of the programme (see Table VII).

In the SASSP, rather than a checklist, an instruction sheet and guidelines for teachers were provided. This included the information on the correct grip of the scissors as well as detailed instructions on how to administer the program in the class.

There are many schools in South Africa where the average class size is of 45 learners³ and therefore the program had to be as easy as possible for the teacher to use in the classroom. The

Table VII: Review of the skills checklist provided in the five scissor skills programmes

Name	Scissors Skill ²⁵	Learn to Cut ²⁶	Developing Basic Scissors Skills ²⁷	Cutting Activities ²⁸	Shapes to Cut ²⁹
Skills Checklist	The teacher is able to record the children's names as well as the ability to cut the practice pages.	The programme includes pre- and post-tests that measure the achievement for each skill. Each pre-test item is structured worksheet. A recording sheet is included for tracking each child's tests and daily progress.	A classroom checklist is provided where each child's skill level is recorded.	Educators do not record the progression of the skill.	Educators do not record the progression of the skill.

administrative tasks were eliminated as far as possible and the programme was designed in such a way, that children could complete it and improve their skill level, as they moved through each step in the programme, without the teacher having to monitor each child individually.

6. Fidelity criteria - These were developed to control and specify the amount and type of scissors skills the child should complete in order to achieve the outcome required for performance in Grade 1.

All children would start with picture 1 and move through to picture 50. No child was to repeat the same picture, no matter what the quality of the cutting out was, as the length of the programme was designed to cover all the steps in the development of scissors skills and provide repetition necessary for consolidating the motor skill involved.

In order to ensure success, the SASSP was reproduced on A4 80 g/m² paper as children of this age group are often already exposed to photocopied material and, therefore, are required to be able to cut paper of this thickness and size. Lower grammage paper such as a magazine paper was excluded, as this paper tears easily and makes the skill of cutting more difficult.

Guidelines in terms of right and left-handed scissors were made depending on the child's dominance, or the preferred hand for cutting. (Some left-dominant children cut with their right hands). Scissors with round-nosed blades made especially for children were chosen so they could fit into the child's hand were selected, as these were perceived to be safer than pointed blades¹⁹. Several brands of scissors were evaluated and those that did not cut well, unless the blades were angled to the paper were discarded, as children who are learning to cut out should be able to practice the skill without concentrating on the tool or having to correct the position of the tool. Round-nosed Basteline scissors were therefore recommended as the most suitable for this study.

Content and construct Validity

The results of the validity studies were taken into consideration and the following changes were made to the SASSP:

1. Programme Length

Occupational therapists in the focus group felt that the length of the programme seemed adequate to develop scissor skills in that age group, especially for those children that had been exposed to previous cutting tasks. It was debated, if the length of this programme would be adequate for those children who had had no previous cutting experience. It was agreed, that this needed to be evaluated and a review of the time available in Grade 0 classrooms with the principal of the pre-primary school resulted in only 41 of the original 50 pictures being included in the SASSP.

2. Picture Components

There was agreement in the focus group as most therapists liked the pictures and felt they were appropriate for the five to six year old age group. One therapist felt they could be made more exciting and the addition of cartoon images was recommended. All of the pictures were re-drawn by a graphic artist to make the pictures consistent in appearance and more simple and appealing for the

young children. The principal of the pre-primary school reported that the participants had enjoyed the pictures that they cut out.

3. Type and Thickness of Lines

All occupational therapists who were in the focus group felt the inclusion of different line thicknesses was appropriate and that the range of thickness was adequate.

The eight completed pictures in the pilot study were evaluated to assess their appropriateness in terms of the children's ability to cut these types of shapes and lines. Pictures were evaluated according to the accuracy, allowing a 1 mm deviation from the thin lines as suggested by Bruininsk in the Bruininsk-Oseretsky Test of Motor Proficiency³³. Both the practice and picture components were evaluated in terms of the ability to stay on the line while cutting. The following were comments made by the therapists:

- ❖ Straight lines – It was felt that this was a good introduction to the scissors skills program as the participants were able to cut on the line, even at the 1 mm line thickness, with varying accuracy.
- ❖ The circle – In general, children tended to cut inside the actual circle irrespective of the line thickness.
- ❖ When cutting out the pictures, there was a general decrease in accuracy of the scissors skills as the complexity of the types of lines increased.

4. Practice and Grading

Therapists in the focus group concurred about the use of a practice component and felt the wide variety of line types included covered all the steps needed in the development of scissor skills in five to six year old children based on their working experience. They agreed with the grading of the line types but debated the level of difficulty of the practice lines. It was, however, agreed, that they should remain in the programme and be assessed in the pilot study with Grade 0 participants. The changes made to the practice components were to

- ❖ The square spiral - This practice section has two designs that are mirror images. One design is for a right-handed child to practice, and the other is for a left-handed child to practice. Thus although it was intended that only one of the designs should be cut out, during the pilot study, it was noted that all participants cut out both of the designs. It was also noted that many participants tended to over-cut in the corners as well. The instructions were thus changed on the instruction sheet, to clearly explain mirror patterns as well as cutting corners.
- ❖ The participants seemed to understand the concept of cutting the outline of the picture (except for the wheel, where all participants cut the spokes as well). The wheel was therefore excluded from the program.

There was also some disagreement in terms of the grading of the picture component, with the change from straight lines to curves and then sharp corners being accepted as correct.

It was felt that some pictures near the end of the SASSP appeared easier to cut out, than those presented earlier and that pictures should be graded to become increasingly more difficult throughout the programme. The pictures were graded according



Table VIII: Revised South African Scissors Skills Programme Summary

Programme length	This programme has 41 pages.
Pictures	Pictures include wild animals, farm animals, fruit, house, boat, South African flag
Picture Grading	The programme overall is graded from straight lines, to corners, to gentle curves, to prominent curves, to circular parts, to pictures with many changes in direction, to finally complex designs.
Picture Grading – Line Thickness	This ranges from 3mm to 1mm. Some pictures have one line thickness only, but most of them vary in thickness.
Practice	There are 41 practice pages.
Practice Grading	The practice section is graded from straight lines, to zigzags (130 degree), to square spiral (90 degree), to zigzags (70 degree), to frog-jumps, to gentle wide wave, to top straight line with bottom circles cut out, to high waves, to top and bottom circles joined in a pattern, to spirals, to circles
Practice Grading – Line Thickness	The straight line starts with a 3 mm line thickness. All other practice lines are between 1 and 2 mm.
Line type	Solid lines are used only.
Skills Checklist	The teacher does not have to track individual children. The researcher planned pre- and post-assessments.

to level of difficulty, taking into account the comments that had been made in the focus group of occupational therapists. Once the pictures were in the correct order of difficulty, they were then combined with the matching practice component.

5. Skills Checklist

Feedback from the principal indicated that the instructions designed for teachers were clear and easy to follow, allowed for the correct scissors grip to be implemented with the children. Instructions were changed however in order to emphasise the correct approach to cutting circles and the square spiral.

The pilot study proved that the content and constructs in terms of the line thickness, grading of lines and shapes and the pictures were with a few exceptions, valid for a programme of scissors skills for five to six year old South African Grade 0 children. The programme was also graded to challenge development of further skill and provided motivation in terms of participation (Table VIII).

Conclusion

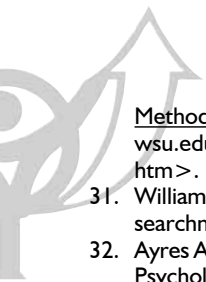
The purpose of this study was to develop a suitable scissors skills programme for Grade 0 children in South Africa at risk of under-achieving in Grade 1 because of inadequate fine motor development. This was done by determining the essential elements to be included in such a program by evaluating available programmes and analysing the internal performance components needed to use scissors. The SASSP was designed by the first author and validated through a review by expert occupational therapists as well as being field tested in a pilot study on Grade 0 children.

Taking the above into consideration, the SASSP was revised and prepared for testing a statistically representative group of Grade 0 children from various socio-economic backgrounds. The implementation of the SASSP by teachers and the effectiveness of the programme will be evaluated in a longitudinal study in Grade classrooms.

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