Fine Motor Development and early school performance

WHAT ARE FINE MOTOR SKILLS?

Fine motor skills are the collective skills and activities that involve using the hands and fingers (Amundson & Weil, 2001; Case-Smith & Shortridge, 1996). That is, fine motor skills are those skills that require the small muscles of the hand to work together to perform precise and refined movements.

WHEN DO FINE MOTOR SKILLS DEVELOP?

Fine motor skills typically develop in a reasonably consistent and predictable pattern in the early years of childhood (from birth through to mid primary school; Exner, 2001). The process begins in infancy when a 2- to 3-month-old baby first bats at a toy, then progresses to grasping, releasing, and transferring objects between their hands (Case-Smith & Shortridge, 1996; Edwards, Buckland, & McCoy-Powlen, 2002; Erhardt, 1994). They then progress to using fingers to manipulate and explore things, stack blocks, self-feed, and dress, and as time goes by, during the early childhood years, use 'school tools' such as scissors, markers, crayons, pencils, and glue.

By the time a child enters Grade 1, there are a number of fine motor skills that they generally demonstrate in a spontaneous and well-integrated manner. Depending on the child's previous experience and exposure to different activities, the quality of these skills varies. However, with age, ongoing experience, and practice, the rate and quality of each child's fine motor skills continues to develop throughout childhood.

However, none of these fine motor skills can develop smoothly without the concurrent development of gross motor (large muscle) skills. In fact, typically, development proceeds in a cephalo–caudal (head to toe) and proximal–distal (moving from the body parts closest to the trunk to those furthest away) pattern (Gesell & Amatruda, 1947). That is why it is important to include things like 'tummy time' for infants, to encourage development of their trunk, shoulder, and hip musculature. In simple terms, this means that development of stable shoulders and upper arms provides a solid base for the development of skills such as self-feeding and using scissors and writing tools. Likewise, without well-developed hip and trunk musculature, sitting upright in a chair becomes quite challenging.

Early developmental skills and milestones work together to provide a solid foundation for the more integrated motor skills required in upper grades. These higher-level skills include being able to write fluently and focus on writing content (such as conveying information, thoughts, and ideas) rather than on the mechanics of writing, which involves pencil grasp, letter formation, spacing, and sizing. Figure 1 shows the progression of typical fine motor development.

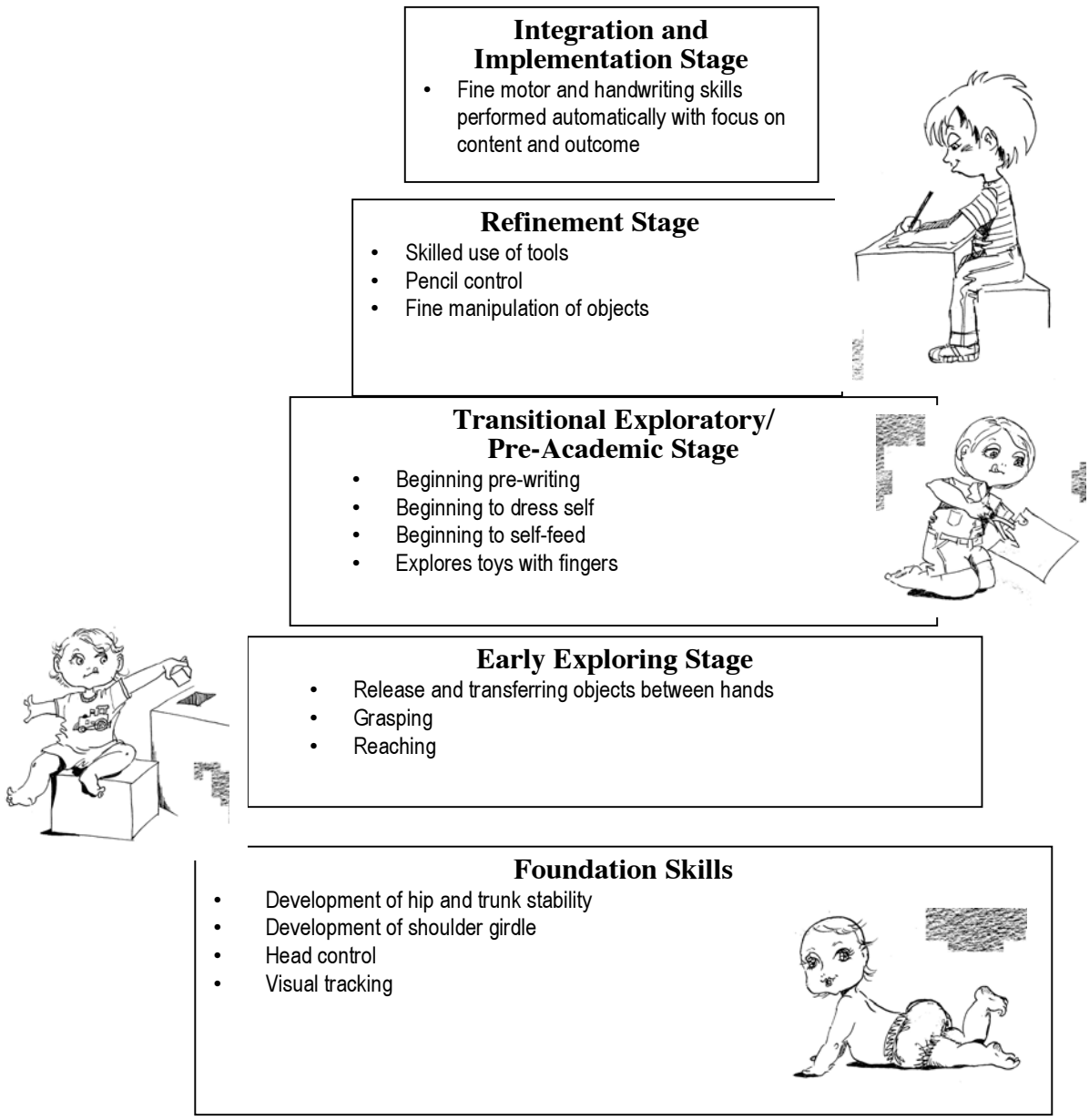

Figure 1. A Bottom–Up Hierarchy and Progression of Typical Fine Motor Development

WHAT FINE MOTOR SKILLS SHOULD CHILDREN BE DEVELOPING TO GET READY FOR FORMAL SCHOOLING?

In the preschool years, the foundational skills developed in infancy and toddler-hood are being built upon as a child *readies* to use school tools. Although many kindergarten, preschool, and early primary school–aged children are fascinated with scissors, crayons, markers, and such, writing and cutting should not be the main focus of fine motor work for 3- to 4-year-olds. It is often more beneficial to use this time of readiness to create a foundation for future school tool use (Yakimishyn & Magill-Evans, 2002). In fact, at this age some children may be extremely reluctant to even pick up a pencil. For these children, it is far better to encourage them to participate in related activities that support the development of the hand and finger muscles needed to correctly hold and use pencils and scissors rather than force them to do writing activities before they are ready. Such activities might include:

- picking up objects using oversized tongs and tweezers
- activating and playing with wind-up toys
- spinning small hand-held tops

- popping bubble plastic with thumb and index finger
- drawing in the sand with a stick, feathers, or straws
- using clothes pegs to help hang up clothes or pictures
- using squirt guns or squeeze-trigger containers (a great way to get windows clean!).

WHAT FINE MOTOR SKILLS CAN BE EXPECTED FROM A CHILD ENTERING SCHOOL?

Children in the first year of school present with varying skill levels, ranging from having highly developed fine motor skills, such as proficient writing skills, to having very definite 'gaps' in their fine motor skills, such as being unable to use scissors or having an inefficient or immature pencil grasp. However, the fine motor skills that *typically developing* 5- to 6-year-olds progressing from preschool or prep to school generally demonstrate are quite amazing and include the ability to:

- demonstrate hand dominance
- use the tips of the fingers and the thumb together in a precise pinch or pincer grasp
- assume and use some form of tripod pencil grasp, where a writing tool is held between the tips of the thumb, index finger, and middle finger (versus a whole hand grasp)
- follow an object smoothly with the eyes only while the head remains still
- cut around reasonably complex designs such as a combination of straight and curved lines and corners, with less than 1 cm deviation from set lines
- draw a circle, triangle, square, and a recognisable picture of a person and a house
- use one hand to stabilise an object and the other to perform a separate activity such as unscrewing a lid and doing up buttons, and think of the stabilising hand as the *helper* hand and the hand performing the task as the *worker* hand
- manipulate small objects within the hand
- put together a complex, interlocking puzzle
- independently complete many self-care tasks such as simple dressing, toileting, shoelace tying, and lunch set-up (Beery, 1997; Brigance, 1978; Case-Smith & Shortridge, 1996; Edwards, Buckland, & McCoy-Powlen, 2002; Exner, 1989; Exner, 2001; Furuno, 1987; Shaffer, 2002).

WHAT IMPACT MIGHT WEAK FINE MOTOR SKILLS HAVE ON A CHILD?

For some children, their hands do not seem to work together in the way that they should (Woodward & Swinth, 2002). This may lead to such frustration that they may resist activities that require them to coordinate all of the muscles and joints in their hands and fingers. As a result, they do not get to practise these skills correctly or develop the correct muscles (Woodward & Swinth, 2002). This in turn may affect the development of higher-level fine motor skills, such as writing. It is often at the stage when formal handwriting instruction has commenced that children are identified as having fine motor weakness (Amundson & Weil, 2001; Dennis & Swinth, 2001). Resultant commonly seen behaviours might include:

- outright refusal to participate in an activity
- avoidance techniques ('I need to get a drink of water')
- anger outbursts (rip up paper/tantrums)
- sadness (crying)
- 'defeatist' behaviour ('I'm no good, I can't do this').

Further, research suggests that children and adolescents with identified motor coordination weakness are at higher risk of experiencing anxiety and even depression associated with their perceived lack of competence in motor activities (Losse et al., 1991; Skinner & Piek, 2001). Therefore, it is important for teachers and parents to be aware of the impact that fine motor skill performance, or a child's perception of their own fine motor performance in relation to their peers, may have on the child's overall behaviour in the classroom. Working to help children develop the best fine motor skills possible at a young age helps to set the stage for success in school and at home, and more so, contributes to them feeling good about themselves. It also has huge run-off benefits for teachers who can then concentrate on teaching concepts of information rather than focusing on the mechanics of cutting, gluing, or writing.

WHAT CAN TEACHERS DO TO HELP?

It is important for teachers to identify those children who are most likely at risk of fine motor weakness as early as possible and to subsequently incorporate specific fine motor activities into those children's day. In fact, many children show significant improvement in their fine motor skills when given greater exposure to and practice in novel fine motor activities (Dankert, Davies, & Gavin, 2003; Marr, Cermak, Cohn, & Henderson, 2003).

Teachers may also play an important part in keeping children motivated to practise skills that they might find challenging. Maintaining a positive and upbeat demeanour and encouraging children to have a go may reduce the likelihood that they will view themselves as a failure and refuse to attempt fine motor tasks in the future. It may also be necessary to modify classroom tasks or reduce expectations until the children experiencing fine motor challenges have developed a greater sense of self-confidence and demonstrated improved skills level.

However, it is important to remember that for some children, fine motor dysfunction may only be part of a broader developmental delay. It is strongly recommended that those children who are identified as at risk be referred for more detailed assessment by an occupational therapist. In fact, when there is any question in your mind about whether a child's fine motor difficulties are part of a more global issue, consult with an occupational therapist. Remember, this book is not a substitute for occupational therapy services.

FREQUENTLY ASKED QUESTIONS

When is the best time to focus on fine motor skills?

If possible, carry out fine motor activities after a period of gross motor activities, those activities involving movement of the large muscle groups of the body such as the shoulders, upper arms, hips, and thighs (AOTA, 1989), especially those requiring some weight bearing through the upper limbs. Fine motor activities initiated after a physical education session, or after a recess period when the children have been running around outside, works very well. This helps to 'awaken' the larger muscle groups and ready them to act as the support and stabilisers necessary for engagement in fine motor activities. Remember, warm-ups work. Creative movement and music are wonderful ways to warm up and prepare children to attend to fine motor work. Fine motor time is a natural lead-in for something academic.

Helpful hint.

- If it is not possible to schedule fine motor activities following a period of gross motor play, try incorporating some strengthening activities within the classroom context, such as crab walks or push-ups from a sitting position or off a wall.

FMC4

Activity 4: Lock and Key

Tools: Locks and keys

Action: Children fit keys into different locks to open them.

△ Introduce speed: 'How many locks can you undo?'

▽ Provide big keys and big locks. Colour-code locks with keys.

Mathematics: Spatial concepts, size discrimination

Bilateral coordination, lateral pincer grasp (thumb placed to side of the middle joint of the index finger) to hold key, planning and organisation

FMC5

Activity 5: Eggcup Spiral

(SEE PHOTO ??)

Tools: Metal spiral eggcups, various-sized beads

Action: Using a pincer grasp, children thread beads onto a metal spiral eggcup. They will enjoy watching the bead spiral its way down the eggcup to the base.

△ For older children who are learning their letters, use alphabet beads. Use this activity to enhance patterning skills, with repetitions of colours, sizes or numbers of beads.

Mathematics and Writing: Counting beads, patterning, letter identification

Pincer grasp, sequencing, visual tracking, bilateral coordination

FMC6

Activity 6: Knot Funny

Tools: Macramé string, wool, shoelaces, nylon craft ribbon

Action: Children tie a basic knot to make a knot necklace, tie a package, or make craft items, such as a wreath.

△ Have children follow a pattern of knots. Thread beads between knots.

▽ Have children make simple knots on colourful strings.

Science and Mathematics: Sequencing, counting

Grasp and finger strength, sequencing, planning and organisation, bilateral coordination

FMC7

Activity 7: Sorting Stuff

Tools: Beans, beads, coins, magnetic letters and numbers, egg cartons

Action: Using a pincer grasp, children sort different-coloured beans and beads, different coin denominations, different letters, and different numbers into different compartments of an empty egg carton.

△ Give a time frame in which to complete the activity. Place container on opposite side of body to their dominant hand to encourage crossing of the midline.

Mathematics and Language: Counting, categorising, object identification.

Pincer grasp, speed, sequencing, bilateral coordination, in-hand manipulation

BM16

Activity 16: Push and Pull Tug

Tools: Towels, ropes, scarves

Action: Child and helper stand, sit, or kneel opposite each other holding onto a towel at either end and play tug, or one child pulls on a towel or rope that is attached at one end to something stable.

Mathematics: Count the number of repetitions or 'wins' achieved each day (it may be fun to keep score).

Shoulder stability, wrist stability and extension, maintaining position

BM17

Activity 17: Push-Ups

Tools: None

Action: In order to protect growing joints, push-ups with knees on the ground are recommended for this age group.

Play 'traffic lights' by having children 'stop' and hold their position at various stages in the push-up, and then 'go' when told to do so.

Mathematics: Count how long children are able to hold the push-up position and the number of repetitions done each day (it may be fun to maintain statistics and chart progress).

Level shoulders; wrist stability; smooth, controlled movement

BM18

Activity 18: Row Your Boat

Tools: None

Action: With partners, children sit with legs stretched out in front touching their partner's feet and holding hands. Pairs pull and push each other as if rowing a boat. Sing *Row, Row, Row Your Boat*.

Have one partner pull the other up into a sitting position from a lying down position.

Language and Memory: Rhyming, verbal recall of song

Smooth, controlled movement

BM19

Activity 19: Swing High, Swing Low

Tools: Suspended swing, balls, beanbags, quoits, boxes

Action: Lying on their tummy on a bolster swing, children throw different items into a box, such as quoits and beanbags.

Specify items to be placed in different boxes, for example, red, blue, and green items, or three different sight words.

Mathematics and Language: Letter, number, colour, and shape identification

Shoulder stability, visual tracking, planning and organisation

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