



## Hand Dominance

### Construct Progression

**DOMAIN:** Physical/Motor Development

**CLAIM:** Students can demonstrate competencies in motor skills and movement patterns.

*This document was developed under a grant from the U.S. Department of Education. However, the contents do not necessarily represent the policy of the Department and you should not assume endorsement by the U.S. Federal Government or the North Carolina State Board of Education.*

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### Background Information

Children will not ALWAYS use their dominant hand in every activity and setting. Some hand switching can be expected even at the highest level of this progression. If a child is only using one hand (same hand) to complete every task and ignoring the other hand, further evaluation of fine motor skills may be required.

### Rationale

Piaget (1954) was one of many developmental psychologists who linked motor skill development with improvements in perceptual and cognitive development. Motor and cognitive functions tend to follow a similar timeline with intensified development between the ages of five and ten (Gabbard, 2008). Grismmer et. al. (2010) emphasize the importance of motor skill development in children. Their data analyses suggest that fine motor skills were a strong predictor of achievement. When analyzed collectively, “attention, fine motor skills, and general knowledge are much stronger overall predictors of later math, reading, and science scores than early math and reading scores alone” (Grismmer et. al., 2010, p. 1008). Recent research stresses the importance of facilitating both motor and academic development as the two continue to be linked in neuroscience research. When comparing gross motor skills of age matched children with and without learning disabilities, researchers found a specific relationship between reading and locomotor skills and mathematics and object control skills - the greater the learning delay, the poorer the motor skills (Westendorp, Hartman, Houwen, Smith, & Visscher, 2011). Sibley and Etnier (2003) conducted a meta-analysis showing a positive correlation between physical activity and seven categories of cognitive performance (perceptual skills, intelligence quotient, achievement, verbal tests, mathematics tests, developmental level/academic readiness, and other) among school-aged children. Crossing the midline is an important milestone of development, reflecting integration of the bodily midline which allows for bilateral coordination (Stilwel, 1987), and is related to hand dominance. Difficulty crossing the midline has been linked to a cluster of sensory, perceptual and motor difficulties exhibited by some children with learning exceptionalities (Ayres, 1972; Michell & Wood, 1999; Stilwell, 1987; Murata & Tan, 2009). Previous research suggests that failure of child between the ages of three and four, to cross the midline could predict later potential problems in development (Michell & Wood, 1999).

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Skills	Performance Descriptors	Example
A. Uses no established dominance for lead/dominant hand (switching still continues).	Child shows no preference for one hand over the other and uses both hands interchangeably during activities.	<i>Maria switches her crayon back and forth between hands when coloring at a table.</i>  <i>Isaiah switches his spoon back and forth between hands when eating yogurt</i>  <i>Ranisha switches her scissors back and forth between hands when cutting paper.</i>
B. Uses established dominant hand.	Child shows a consistent preference for one hand over the other and uses this hand during activities.	<i>Darnell draws with his left hand (dominant hand) but doesn't stabilize paper with his right hand.</i>  <i>Nina holds the fork with her right hand (dominant hand) but doesn't stabilize the plate with her left hand.</i>  <i>Archer cuts with her right hand (dominant hand) but doesn't turn the paper with her left hand to help her cut out a shape.</i>
C. Manipulates with dominant hand with assistance from other hand.	Child shows a consistent preference for a dominant hand and uses the other hand to assist during activities.	<i>Declan draws with his right hand (dominant hand) and stabilizes the paper with his left hand.</i>  <i>Ebony holds a fork with her left hand (dominant hand) and stabilizes the bowl with her right hand.</i>  <i>Manuel cuts with his right hand (dominant hand) and turns the paper with his left hand to help him cut out a shape.</i>

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## Resources

Ayers, A. (1972). Types of sensory integrative dysfunction among disabled learners. *American Journal of Occupational Therapy*, 26(1), 13-18.

Ayers, A. (1972). Improving academic scores through sensory integration. *Journal of Learning Disabilities*, 2(3), 44-52.

Belmont, L., & Birch, H. G. (1963). Lateral dominance and right-left awareness in normal children. *Child Development*, 257-270.

Bornstein, M. (Ed.). (in press). Handbook of cross cultural developmental science: Vol.1. *Moving between cultures: Cross cultural research on motor development* (1-23). New York, NY: Psychology Press.

Case-Smith, J., & Pehoski, C. (1992). *Development of hand skills in the child*. Rockville, MD: American Occupational Therapy Association.

Cermak, S. A., Quintero, E. J., & Cohen, P. M. (1980). Developmental age trends in crossing the body midline in normal children. *The American Journal of Occupational Therapy*, 34, 313-319.

Diamond, A. (2000). Close integration of motor development and cognitive development and of the cerebellum and prefrontal cortex. *Child Development*, 71, 44-56.

Gabbard, C. P. (2008). *Lifelong motor development* (5th ed.). San Francisco, CA: Pearson/Benjamin Cummings.

Gallahue, D., & Ozmun, J. (2005). *Understanding motor development: Infants, children, adolescents, adults* (6th ed.). New York, NY: McGraw Hill.

Graham, G., Holt-Hale, S., & Parker, M. (2010). Skill themes, movement concepts, and the national standards. In G. Graham, S. Holt-Hale, & M. Parker (Eds.), *Children moving: A reflective approach to teaching physical education* (pp. 27-39). McGraw-Hill Higher Education. Retrieved from [www.mhhe.com/graham8e](http://www.mhhe.com/graham8e)

Grissmer, D., Grimm, K., Aiyer S., Murrah, W., & Steele, J. (2010). Fine motor skills and early comprehension of the world: Two new school readiness indicators. *Developmental Psychology*, 46(5), 1008-1017.

Haywood, K. (2009). *Life span motor development* (5<sup>th</sup> ed.). Champaign, IL: Human Kinetics.

Horvat, M. (2011). Teaching motor, sport, and play skills. In M. Horvat, L.H. Kalakian, R. Croce, & V. Dahlstrom, *Developmental/adapted physical education making ability count* (5th ed.). San Francisco, CA: Pearson/Benjamin Cummings.

Hynes-Dusel, J. (2002). Motor development in elementary children. *Strategies: A Journal for Physical and Sport Education*, 15(3), 30-34.

Kaufman, A. S., Zalma, R., & Kaufman, N. L. (1978). The relationship of hand dominance to the motor coordination, mental ability, and right-left awareness of young normal children. *Child Development*, 885-888.

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- Malina, R. M. (2004). Motor development during infancy and early childhood: Overview and suggested directions for research. *International Journal of Sport and Health Science*, 2, 50-66.
- McAfee, O., & Leong, D.J. (2010). *Large muscle development*. Retrieved from <http://www.education.com/reference/article/large-muscle-development-assessment>
- McManus, I. C., Sik, G., Cole, D. R., Mellon, A. F., Wong, J., & Kloss, J. (1988). The development of handedness in children. *British Journal of Developmental Psychology*, 6(3), 257-273.
- Michell, D., & Wood, N. (1999). An investigation of midline crossing in three-year old children. *Physiotherapy*, 85(11), 607-615.
- Motor development. (2005). In Cambridge Encyclopedia of Child Development. Retrieved from [http://www.credoreference.com/entry/cupchilddev/motor\\_development](http://www.credoreference.com/entry/cupchilddev/motor_development)
- Murata, N. M., & Tan, C. A. (2009). Collaborative teaching of motor skills for preschools with developmental delays. *Early Childhood Education*, 36, 483-489.
- Piaget, J. (1954). *The construction of reality in the child*. New York, NY: Basic Books.
- Piek, J. P., Dawson, L., Smith, L. M., & Gasson, N. (2008). The role of early fine and gross motor development on later motor and cognitive ability. *Human Movement Science*, 27, 668-681.
- Sattelmair, J., & Ratey, J. (2009). Physically active play and cognition an academic matter. *American Journal of Play*, (winter), 366-374.
- Sibley, B. A., & Etnier, J. L. (2003). The relationship between physical activity and cognition in children: A meta-analysis. *Pediatric Exercise Science*, 15, 243-256.
- Stilwell, J. M. (1987). The development of manual midline crossing in 2- to 6-year-old children. *The American Journal of Occupational Therapy*, 41(12), 783-789.
- Tan, N. M., Tan, C. A. (2009). Collaborative teaching of motor skills for preschools with developmental delays. *Early Childhood Education*, 36, 483-489.
- Viholainen, H., Ahonen, T., Lyytinen, P., Cantell, M., Licssc, A. T. and Lyytinen, H. (2006), Early motor development and later language and reading skills in children at risk of familial dyslexia. *Developmental Medicine & Child Neurology*, 48, 367–373. doi: 10.1017/S001216220600079X
- Westendorp, M., Hartman, E., Houwen, S., Smith, J., & Visscher, C. (2011). The relationship between gross motor skills and academic achievement in children with learning disabilities. *Research in Developmental Disabilities*, 32, 2773-2779.
- Williams, H., & Monsma, E. (2004). Assessment of gross motor development in preschool children. In B. Bracken (Ed.), *The psychoeducational assessment of preschool children* (3rd ed.) (pp.397-431). Mahwah, NJ: Lawrence Erlbaum.