Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2001 Volume VI: Human Intelligence: Theories and Developmental Origins

Developing and Assessing the Intelligence of a Kindergartner: A Practical Approach

Curriculum Unit 01.06.05
by Francine Coss

The topic of intelligence cannot be taught conceptually to my Kindergarten students; the theory is too complex and inappropriate for their age group. However, the brain as a concrete object that houses intellect can be taught at a basic level. Through a combination of the biological brain and the use of the constructivist theory I will improve the cognitive domains of my students.

The Human Brain and Cognitive Development:

> Scientists have found that the rate of synapse formation peaks around age 4, resulting in synaptic density levels that are 50% higher than adults, indicating increased brain activity. This increased neural activity suggests that this might be an optimal time for cognitive growth and development, and this information is a major reason educators have become interested in brain development. (Eggen, 2001)

The human brain has between 100 and 200 billion neurons (nerve cells), and connections between them, called synapses. (Jensen, 1998) Information flows in one direction only; going from the cell body down the axon to the synapse. (Jensen, 1998) How neurons make connections is illustrated in Figure 1.
(figure available in print form)

Research on brain development points to three major findings: (1) rapid brain growth occurs during early stages of development, (2) rapid brain growth results in critical periods of development for central processes like language and perception, and (3) enriched environments can result in increased brain growth and development. (Bruer, 1999) These three findings support the need for brain-based instruction, especially in the early grades.

Brain-based, or learner-centered, instruction is grounded in constructivism, and the characteristics of learner-centered teaching grow directly out of this view of learning. (Eggen, 2001) Constructivists believe that learners construct their own understanding, that new learning exists in the context of prior understanding, that learning is enhanced by social activity, and that authentic tasks promote learning. (Eggen, 2001) Types of learner-centered instruction include (a) discovery learning, (b) problem-based inquiry, (c) discussions, and (d) cooperative learning.

Learner-centered instruction, or any successful type of instruction, cannot occur in a non-supportive classroom environment. Productive learning environments are safe, orderly, and learning focused. Learner-centered instruction requires students to feel free to offer conclusions, conjectures, and evidence without fear of criticism or embarrassment. (Eggen, 2001) Modeling these behaviors and insuring a safe environment are the responsibility of the teacher, especially of students who may not be familiar with learner-centered instruction.

Rapid brain growth in the early stages of development via a stimulating classroom environment that reinforces the language and perception processes should not conjure images of chaos and haphazard incentive. A truly stimulating classroom environment offers reinforcers to instruction. Buttressing the development of the young brain, the classroom must first and foremost reinforce of language and perception.

Language Development

Behaviorists suggest that language learning is the acquisition of sounds and words resulting from reinforcement. (Skinner, 1953) For instance,

> A 2-year-old picked up a ball and said, "Baa." Mom smiled broadly and said, "Good boy! Ball." The little boy repeated, "Baa." Mom responded, "Very good." Mom's "Good boy! Ball." and "Very good." Reinforced the child's efforts and, over time, language developed. (Eggen, 2001)

Social cognitive theory emphasizes the role of modeling, the child's imitation of adult speech, adult reinforcement, and corrective feedback. (Bandura, 1977) An example of this is:

> "Give Daddy some cookie."
>
> "Cookie, Dad."
>
> "Good. Giselle gives Daddy some cookie."

Here Giselle's father modeled an expression, she attempted to imitate it, and he praised her for her efforts. (Eggen, 2001)

Both behaviorism and social cognitive theory make intuitive sense. Children probably do learn certain aspects of language by observing and listening to others, trying it out themselves, and being reinforced. Scientists who study the development of language in different cultures, however, believe something else is occurring. (Eggen, 2001)

According to Noam Chomsky (1972), the father of nativist theory, the language acquisition device (LAD) is a genetic set of language-processing skills that enables children to understand the rules governing others' speech and to use these in their own speech. Nativist theory asserts that all humans are genetically "wired" to learn language and that exposure to language triggers this development. (Eggen, 2001)

Most developmental psychologists believe that language is learned through a combination of factors that include both an inborn predisposition, as Chomsky proposed, and environmental factors that shape the specific form of the language. (Eggen, 2001) All these in combination are supported by Vygotsky's constructivist theory.

Perception

Perception is the process by which people attach meaning to experiences. (Eggen, 2001) Perception is critical because it influences the information that enters working memory. Information in working memory is in the form of "perceived reality" rather than "true reality." If students misperceive the teacher's examples, the information that enters working memory will be invalid, as will the information they transfer to long-term memory. (Eggen, 2001)

An effective way of checking students' perceptions is to review by asking open-ended questions. (Kauchak, 1998) For example, after writing the equation below on the chalkboard, the science teacher may say, "Look at the equation. What do you notice about it?"

$CaCo3 + CO2 + H2O => Ca + 2HCO3$

If students can't identify essential information, such as the elements involved, the numbers of each in the compounds, and what the arrow means, the teacher knows that their perceptions are inaccurate or incomplete, and she can then adjust her review to cover these features. (Eggen, 2001)

Meaningfulness: Rehearsal and Encoding

Finding meaning in stimuli requires rehearsal and making connections in long-term memory. Rehearsal is the process of repeating information over and over, either aloud or mentally, without altering its form. (Eggen, 2001) While rehearsal is primarily used to retain information in working memory until it is used, if rehearsed enough, it can sometimes be transferred to long-term memory. (Atkinson, 1968) This is an inefficient method of transferring information, however, it is one of the first memory strategies that develops in young children. (Berk, 1997) Constructivism and brain-based theory allow for rehearsal but expects what is rehearsed to then gain meaning, or become encoded, before being transferred to long-term memory. Encoding is the process of placing information in long-term memory (Bruning, 1999); it is perhaps the most critical cognitive process affecting perception. When encoding information, our goal is for it to be meaningful. Meaningfulness describes the number of connections or associations between an idea and other ideas in long-term memory. (Gagne, 1993) The more background information that exists, and the more interrelated that the knowledge is, the more locations a learner has to connect the new information and the more likely it is to be meaningfully encoded. (Eggen, 2001) These learning requirements of rehearsal and encoding are supported through the twelve principles for brain-based learning.

The Twelve Principles for Brain-Based Learning

The brain-based learner downshifts under threat, learns via peripheral events, has a unique brain, learns via conscious and unconscious processes, has various types of memory, and learns best when content is embedded in experience. (The Talking Page Literacy Organization, 2001) Belief in the brain-based learner theory requires the classroom teacher to provide a safe yet challenging environment for students. Active reflection by the student is necessary for concepts to be truly understood. Table 1 lists the twelve principles of brain-based learning and their brief definitions. The basis for their theory is 'whole brain' teaching to make connections. This theory supports learner-centered instruction.

(table availabale in print form)

Teaching to the Brain: Teacher-Centered versus Learner-Centered Instruction

Teacher-centered approaches involve instruction in which the teacher's role is to present the knowledge to be learned and to direct, in a rather explicit manner, the learning process of the students, where as learner-centered approaches include instruction in which learners, with the teacher's guidance, are made responsible for constructing their own understanding. (Eggen, 2001) Traditionally, the teacher-centered approach has held as the most effective, especially for the teaching of mathematics and reading. The teacher-centered approach keeps the educator in direct control of the knowledge. The learner-centered approach puts the power of knowledge in the hands of the student often requiring more project-based activities and self-assessment. The teacher is in control, behind the scenes, guiding the students in the pursuit of understanding the concept(s) at hand.

(table availabale in print form)

The learner-centered approach takes what is common and expected in the teacher-centered approach and alters the learning perspective, creating a new activity having the same outcome. The teacher-centered approach versus the learner-centered approach is illustrated below (See Table 2). The same outcomes occur via small changes in approach. With the learner-centered approach the learner gains knowledge using a more meaningful method for the learner. Knowledge gains last longer and are more easily applied to new knowledge.

Constructivism: A Developmentally Based View of Teaching and Learning:

Constructivism is a view of learning and development that emphasizes the active role of the learner in building understanding and making sense of the world. (Eggen, 2001) This is best quantified through the juxtaposition of familiar Piaget and the not-always-so-familiar Vygotsky. (See Table 3)

(table availabale in print form)

With Vygotsky's view of learners, language development occurs socially through children practicing it in their interactions with adults and peers. Language development appears effortless because it is embedded in everyday activities and the process of communication. (Eggen, 2001) Teachers and other adults promote language development through interactions that encourage children's use of language and feedback that helps correct and refine language. (Arnold, 1994) Constructivism blends the behaviorist theory, the social cognitive theory and the nativist theory to address all aspects of learning and teaching.

Teaching the Brain: Biology in Action

The adult human brain weighs about 3 pounds (1300-1400 grams). By comparison, a sperm whale brain weighs about 7 pounds, a dolphin brain weighs about 4 pounds and a gorilla brain about 1 pound. (Jensen, 1998) Humans have large brains relative to body weight. Close to the size of a large grapefruit or cantaloupe, the brain is 78% water, 10% fat, and 8% protein. A living brain is so soft it can be cut with a butter knife. (Jensen, 1998)

A view of the outside of the brain shows convolutions, or folds. These folds are part of the cerebral cortex. The cerebral cortex is the orange-peel-like outer covering of the brain. The folds allow the covering to maximize surface area. In fact, if it were laid out, the cortex would be about the size of an unfolded single page from a daily newspaper. (Jensen, 1998)

The human brain is divided into cerebral hemispheres: the left and the right. The two sides are connected by bundles of nerve fibers, the largest known as the corpus callosum. The corpus callosum has about 250 million nerve fibers. (Jensen, 1998) The corpus callosum allows each side of the brain to exchange information.

Scientists divide the brain into four lobes: occipital, frontal, parietal, and temporal. The occipital lobe is in the middle-back of the brain. It's primary responsible for vision. The frontal lobe is the area around your forehead. It is involved with purposeful acts like judgment, creativity, problem solving, and planning. (Jensen, 1998) The temporal lobes (left and right side) are above and around the ears. This area is primarily responsible for hearing, memory, meaning, and language. (Jensen, 1998) However, there is some overlap in lobe functions.

The middle of the brain includes the hippocampus, thalamus, hypothalamus, and amygdala. This middle area is known as the limbic system. The limbic system is responsible for emotions, sleep, attention, body regulation, hormones, sexuality, smell, and production of most of the brain's chemicals. (Jensen, 1998) In the back-lower area of the brain is the cerebellum, which is primarily responsible for balance, posture, motor movement, and some areas of cognition. (Jensen, 1998)

(figures available in print form)

Assessing Classroom Learning:

Classroom assessments include all the processes involved in making decisions about students' learning progress. (Airasian, 1997) Classroom assessments consist of many measures including students' written work, their answers to questions in class, and performance on teacher-made and standardized tests. (Eggen, 2001) Teachers make decisions about learning progress through assessment. The two main goals of assessment are (1) increasing learning and (2) increasing motivation. (Eggen, 2001)

Early Screening Inventory (ESI)

The ESI (Wiske and Meisels, 1983) is administered annually in September to all incoming New Haven Public School (NHPS) Kindergarten students. Students are scored according to the performance expectations of their chronological age. The ESI is used to determine students who may be at risk entering Kindergarten. Scores acquired through the use of the ESI may afford the insight necessary for a teacher to increase learning by offering lessons which address gross motor skills, fine motor skills, memory and perception abilities. However, the ESI is not re-administered to the student, denying any improvement information or comparison for the teacher. In fact, the ESI kit available to Kindergarten teachers in the district is not valid if a student reaches an age above 6 years.

Letter Identification (LetterID)

The LetterID assessment (Clay, 1993) is administered three times during the school year: October, January, and May. The students are shown a chart of letters and are asked to identify each letter of the alphabet, capital and lowercase. A total of 54 letters can be identified: 52 manuscript letters and 2 print letters (g and a). The New Haven Public Schools collects letter identification scores only. The LetterID test however allows for phonetic sound identification and initial sound identification for each letter.

The LetterID assessment offers one on one opportunities to check letter identification and sound abilities. In some classrooms, the LetterID assessment is being replaced with the letter assessment segment of Breakthrough to Literacy software. This alternative is helpful yet the results vary greatly from the one on one LetterID assessment.

The LetterID assessment increases learning and motivation by providing pertinent information to the teacher and necessary feedback to the student. The teacher can better serve the student by addressing his/her deficiencies in flexible or cooperative group activities. The student becomes more motivated via the frequent feedback throughout the school year. A goal of 54 letters is set in October and can be achieved in most cases by May.

Concepts About Print (CAP)

The CAP assessment (Clay, 1972) uses one of two books (Sand or Stones) to assess the ability of a student to identify print. Various errors in text and illustrations offer opportunities for the assessor to note the reading cues used by the student. A student can score up to 24 points on this assessment. The CAP is administered three times during the academic year in NHPS: October, January, and May. The CAP provides an opportunity for the assessor to group students according to deficient assessment areas. Flexible grouping is best suited for CAP score improvement.

The CAP offers specific information regarding reading cues and miscues. The skills required for CAP score improvement are also the skills necessary to read. The CAP is a one on one assessment that provides legitimate information to assist in student achievement.

The CAP identifies specific skills necessary for literacy and assesses the child's skill ability. The score is easily analyzed affording the teacher to address the needs of the student(s). The students receive no negative feedback, only positive, since the missed items are not obvious to a student. If the student does not notice a mistake in the text or in the illustrations, he/she does not realize it. The obvious mistakes to the teacher assist in diagnosis and facilitation of learning. The CAP offers opportunities for increasing learning more obviously than opportunities for increasing motivation.

Developmental Reading Assessment (DRA)

The DRA (Beaver, 1999) delineates reading ability across 44 levels. Students are expected to read books according to their grade and ability level. The state of Connecticut has mandated the use of the DRA in all grades through grade 5. In New Haven, a student's DRA score determines placement in summer school and/or grade level retention.

The DRA was developed by Joetta Beaver as an assessment tool in determining a student's ability to read unfamiliar text. An instructional level of proficiency as well as an independent level of proficiency is determined via a percentage of errors. Each DRA level is represented by a book containing characteristics appropriate for that reading level.

The DRA is administered only once in Kindergarten (May) and is used as a baseline for grade one teachers. This administration requirement for the Kindergarten is insufficient for diagnosis. The DRA is administered twice per academic year in grades 1-5, also too infrequent for true diagnosis.

The DRA is a time-consuming but tale-telling assessment that should be utilized more frequently by the classroom teacher. Increasing learning and increasing motivation is key for success with the DRAs format. As the student finds success in one book he/she continues with a second, third, forth, and so on until he/she fails to successfully read and comprehend the story. When this failure occurs, the student is not as aware as he/she might be with failure on the LetterID assessment. The impetus to read another book successfully is a student-set goal.

Mathematics Assessments

Currently there are no mandated mathematics assessments used in New Haven Public Schools. The Saxon Math Series (Larson, 2001) offers periodic concept assessments at each grade level, K-4, however some New Haven Public Schools do not use the Saxon Math Series.

Students who are above grade level in mathematics can be retained due to poor DRA (or reading) scores. This mandatory retention for reading does not address the varying math skills among students. The thrust of New Haven Public Schools is literacy, not numeracy. Yet, the total student is comprised of both abilities.

Maintaining the need for purposeful assessment, NHPS and districts like it must teach and assess the whole child; not compromising the goals of assessment. Assessments are required but not necessarily utilized to benefit the teacher or the learner. It is up to the teacher to weed through the data and apply the necessary strategies to assist in learner achievement in all subject areas, remembering the goals of increasing learning and increasing motivation for the student.

Conclusion

The cognitive development of the human brain is not concrete enough to be presented conceptually to Kindergartners. However, the biology of the brain, the weight, size, shape and sections of the brain are concrete and can be taught. Understanding the biology of the brain will lead students to better understanding the abstract workings of cognition.

Educators must address the needs of their students by first informing them of the brain's abilities. The twelve principles of brain-based learning and constructivist theory go hand in hand in a classroom that exemplifies learner-centered instruction. Traditional tests as well as other forms of assessment offer the teacher, and student, the opportunities to increase learning and motivation. These opportunities must be regular and consistent for success.

Lessons and Activities:

The lesson plans will reflect the methods discussed in the unit and will be applicable to all subject areas and grade-levels above and below Kindergarten. Specifically, Lesson One relates to the biology of the brain and how to make the brain a concrete object for children. Lesson 2 approaches concept 'meaningfulness' via the integration of technology and rehearsal. Finally, Lesson 3 will offer an alternate assessment tool supporting the old-style of testing while utilizing technology. The annotated bibliography will offer on-line activities on the biology of the brain.

Lesson Plan One: Building a Brain

Read the book, *Look Inside Your Brain* by Heather Alexander and Nicoletta Costa, (1998).

Following the book, ask the students to name objects that are the same size, shape, and weight as the human brain. Create a chart displaying the students' answers.

Show a model brain. Encourage the students to touch the model brain, feeling the folds, etc. Solicit student opinions regarding the model...true to size, shape, and weight? Continue to make connections to the chart displaying the brain-like objects.

Display a 'potato flake' brain (created before the lesson). Allow the students to touch the 'potato flake' brain and compare it to the brain model. Ask the students which model best depicts the true brain according to their brain-like objects.

Offer to create a 'potato flake' brain in class (one per student/one per table/one per cooperative group). Display the recipe and organize the ingredients as necessary. When complete, use the 'potato flake' brain in an integrated science center. Provide some of the suggested brain-like objects for comparison. Offer a scale for weight comparison, a ruler for size comparison and any other pertinent tools or supplies.

Display student-created comparison charts. Review the work completed at the center by graphing the comparisons and re-asking the question: What objects are the same size, shape and weight as the human brain?

"Potato Flake" Brain

(Recipe from the Pacific Science Center)

Ingredients:

1.5 cups (360 ml) instant potato flakes
2.5 cups (600 ml) hot water
2 cups (480 ml) clean sand
1 gallon-size zipper plastic bag

Directions:

Combine all the ingredients in the zipper plastic bag and mix thoroughly. It should weigh about 3 lbs (1.35 kg) and have the consistency of a real brain. Display a model brain for accuracy.

Lesson Plan Two:

Using HyperStudio as a Rehearser for the Pre-Writer

Materials: Video camera --- or ---

35mm Camera and scanner --- or ---

Digital Camera

HyperStudio Multimedia Software

Macintosh --- or --- PC computer

Before beginning this, or any unit, devise a plan for recording the lesson activities, the cooperative group reactions, the concrete examples of concept and all other pertinent information, (i.e., 35mm photographs, digital camera, video camera). Enter these recordings into a card stack using HyperStudio Multimedia Software (Wagner, 1999). (Available online or at most office supply or computer supply stores for use on both the Mac and the PC. The cost is $120.00, but some school systems hold a site license for the program).

Following a series of lessons on the biology of the brain, organize your HyperStudio stack by following the directions provided with the software and review the images with your students. As each image is viewed, solicit information about the image…What were we doing? What did we learn? What do we know now that we completed this activity?

Select the answer that best describes the image and record the answer using the built-in HyperStudio audio recording software. Type the answer, verbatim, under the image.

Repeat this process until all the images are attached to an audio description.

Review the HyperStudio stack, listening to the descriptions and viewing the images. Encourage the students to re-visit the stack during center or free play time.

Note: Those familiar with HyperStudio will better comprehend this rehearsal stack. Those unfamiliar with HyperStudio should visit the company's website for sample stacks and cards at www.HyperStudio.com. A tutorial is also available from the company.

Lesson Plan Three:

Using HyperStudio as an Assessment Tool for the Pre-Reader

Materials: Video camera --- or ---

35mm Camera and scanner --- or ---

Digital Camera

HyperStudio Multimedia Software

Macintosh --- or --- PC computer

Utilizing the same resources for creating a pen-and-paper, teacher-created test, create a HyperStudio test stack with moveable images, multiple-choice answers, and internet connections.

HyperStudio Multimedia Software contains a test feature that will track test results. This test feature offers the teacher an alternative to 40+ minute blocks dog-eared for testing. The HyperStudio test could be taken by a student and scored without losing precious teaching time.

As in lesson two, using the instructions for creating a test provided with the HyperStudio software, create a test stack with images to be labeled, assembled and even websites to be visited. The testing aspect of the program will record the student's answers in a student file. Correct answers could be contingents to internet enrichment or incorrect answers could be contingents to revisiting the review stack from lesson two. The possibilities are endless.

Your first test stack will require an excessive amount of time as you tweak it and become familiar with the software. After the completion of your first test stack, you can use that stack as a template for additional stacks for future units. Images, test questions and internet links.

Note: Those familiar with HyperStudio will better comprehend this test stack. Those unfamiliar with HyperStudio should visit the company's website for sample stacks and cards at www.HyperStudio.com. A tutorial is also available from the company.

Teacher Resources

Arnold, D., C. Lonigan, G. Whitehurst, and J. Epstein. (1994). *Accelerating Language Development through Picture Book Reading: Replication and Extension to a videotape-learning format* . Journal of Educational Psychology, 86(2), 235-243.

Atkinson, R. and R. Shiffrin. (1968). Human Memory: A Proposed System and Its Control Processes. In K. Spence and J. Spence (Eds.), *The Psychology of Learning and Motivation: Advances in Research and Theory* (Volume 2). San Diego: Academic Press. An article discussing memory within a larger book containing learning theory research.

Bandura, A. (1977). *Social Learning Theory* . Upper Saddle River, New Jersey: Prentice Hall. A book that discusses the Social Learning Theory in depth.

Berk, L. (1997). *Child Development* (Fourth Edition). Needham Heights, Massachusetts: Allyn & Bacon. A child development textbook describing multiple theories of child development and learning theories.

Bruer, J. (1998). Brain Science, Brain Fiction. *Educational Leadership* , 56(3), 14-18. An article covering the myths and facts about the brain and brain theory.

Bruer, J. (1999). In Search of Brain-Based Education. *Phi Delta Kappan* , 89(9), 649-657. An article describing brain-based education for educators. It offers information related to schools and districts that embrace brain-based learning.

Bruning, R., G. Schraw, and R. Ronning. (1999). *Cognitive Psychology and Instruction* (Third Edition). Upper Saddle River, New Jersey: Prentice Hall. A specialized reference for cognitive theory.

Chomsky, Noam. (1972). *Language and Mind* (Second Edition). Orlando, Florida: Harcourt Brace. Noam Chomsky has written several books about language acquisition. This work parallels language and brain functions.

Clay, Marie. (1997). *An Observation Survey of Early Literacy Achievement* . Reed Publications Limited. A comprehensive book describing techniques for assessing and improving reading skills including Concepts About Print, LetterID, etc.

Clay, Marie. (1972). *Sand* . Birkenhead, Auckland: Heinemann Education Books. A book containing language/reading 'mistakes' to be found by a pre-reader/reader.

Clay, Marie. (1979). *The Concepts About Print Test* . Birkenhead, Auckland: Heinemann Education Books. Full instructions for the administration of the test used with the book, Sand.

Beaver, Joetta. (1999). *Developmental Reading Assessment* . Upper Saddle River, New Jersey: Prentice Hall. An assessment book of folders containing leveled mini-books that can be used from Kindergarten through grade four.

Eggen, Paul and Don Kauchak. (2001). *Educational Psychology: Windows on Classrooms* . Upper Saddle River, New Jersey: Merrill Prentice Hall. A graduate level textbook containing current theories and overviews of their application.

Jenson, Eric. (1998). *Teaching with the Brain in Mind* . Alexandria, VA: Association for Supervision and Curriculum Development. A book which gels the many theories of learning styles and teaching with biology.

Gagne, E., C. Yekovich, and F. Yekovich. (1993). *The Cognitive Psychology of School Learning* (Second Edition). New York: HarperCollins. Describes cognitive theory as it applies to the classroom environment and teaching styles.

Kauchak, D. and P. Eggen. (1998). *Learning and Teaching: Research-Based Methods* (Third Edition). Needham Heights, Massachusetts: Allyn & Bacon. A book that describes research-based methods of teaching. It supports constructivist theory.

Larson, Nancy. (2001). Saxon Math K: *An Incremental Development* (First Edition). Norman, Oklahoma: Saxon Publishers, Incorporated. A mathematics curriculum for Kindergarten students developed by a West Haven, Connecticut teacher containing over 100 lessons and 14 assessments.

Skinner, B. (1953). *Science and Human Behavior* . New York: Macmillan. A book that delves deeply into behaviorist theory.

The Talking Page Literacy Organization. (1998-2001). *The Twelve Principles for Brain-Based Learning* . [On-line]. Available: http://www.talkingpage.org/ A website supported by the Sonoma County, California school district.

Wiske, Martha S. and Samuel J. Meisels. (1983). *Early Screening Inventory (ESI) Test and Manual* . Columbia University, New York: Teachers College Press.

Student Resources

Alexander, Heather and Nicoletta Costa. (1998). *Look Inside Your Brain* . New York: The Putnam Publishing Group. Seven double-page spreads cover physiology, voluntary and involuntary actions, senses, memory, learning, and creativity.

Chudler, Eric H. *The Neuroscience for Kids Coloring Book. Neuroscience of Kids* . [On-line]. Available: http://faculty.washington.edu/chudler/colorbook.html A ten-page coloring book containing brain illustrations, illustrations of brain parts, and even illustrations of neuroscientists on the web. Available in Adobe PDF format.

Simon, Seymour. (1999). *The Brain: Our Nervous System* . New York: Morrow, William, and Company. Descriptions of the anatomy and function of the parts of the brain, long and short term memory, neurons, dendrites, and more.

Audio-Visual/Technology Resources

Wagner, Roger. (1999). HyperStudio Multimedia Software 4.0 Edition. Software for creating interactive stacks of information. Can be used for testing, reviewing material or presentations.