

Selecting Software for Students with Learning Disabilities

Contributing Authors

Marcia Krull, Learning Disability Specialist
Mt. San Jacinto College

Sue Norton, Learning Disability Specialist
Palomar College

Linda Reither, Learning Disability Specialist
Reedley College

Patti Flores Charter, Learning Disability Specialist
Southwestern Community College

Therese Hukill-DeRock, Learning Disability Specialist
Yuba Community College

Christine Tunstall, Learning Disability Specialist
Mt San Antonio College

Mary Hunt, Learning Disability Specialist
Cerritos College

Mary Stephens, Learning Disability Specialist
Santa Ana College, School of Continuing Education

Kristina De La Cerda, Acquired Brain Injury/Learning Disability Specialist
Santa Ana College Communications Disabilities/ABI Program

Produced by

**The High Tech Center Training Unit
of the California Community Colleges
21050 Mc Clellan Road
Cupertino, CA 95014**

Production Assistance

Carl Brown
Bong Deparine

Project Facilitator & Editor

Jayne Johnson

Version 3.0



URL to our CC license: <http://creativecommons.org/licenses/by-nd-nc/1.0/>

Creative Commons website: <http://creativecommons.org>

Contents

Contributing Authors.....	ii
Produced by	ii
Introduction	ix
The Deficit Areas.....	x
Cognitive	x
Achievement	x
Special Considerations	xi
General Guidelines	xiii
Organization.....	xiii
Methodology	xiv
Cognitive Deficits	1
Long Term Retrieval	1
Definition	1
Assessment Measures.....	1
Functional Implications	1
Instructional Goal.....	2
Instructional Considerations.....	2
Software Characteristics	3
Recommended Software.....	4
Short-Term Memory and Working Memory	7
Definition	7
Assessment Measures.....	7
Short-Term Memory	7
Working Memory	7
Functional Implications	8
Instructional Goal.....	9
Instructional Considerations.....	9
Software Characteristics	9
Recommended Software.....	10
Processing Speed Clusters	13
Definition	13
Assessment Measures.....	13
Functional Implications	14
Instructional Goal.....	14
Instructional Considerations.....	15
Software Characteristics	15
Recommended Software.....	16
Visual-Spatial Thinking and Perceptual Organization.....	19
Definition	19

Assessment Measures.....	19
Functional Implications	20
Instructional Goals	21
Instructional Considerations.....	21
Software Characteristics	21
Recommended Software.....	22
Knowledge and Verbal Comprehension	25
Definition	25
Assessment Measures.....	25
Functional Implications	25
Instructional Goal (Vocabulary).....	26
Instructional Considerations (Vocabulary)	26
Software Characteristics (Vocabulary).....	26
Instructional Goal (Verbal Comprehension).....	27
Instructional Considerations (Verbal Comprehension).....	27
Software Characteristics (Verbal Comprehension)	28
Recommended Software.....	29
Vocabulary	29
Verbal Comprehension	30
Fluid Reasoning and Abstract Reasoning	31
Definition	31
Assessment Measures.....	31
Functional Implications	31
Instructional Goal.....	32
Instructional Considerations.....	32
Software Characteristics	33
Recommended Software.....	34
Auditory Processing (Cognitive Cluster) and Phonemic Awareness (Clinically Useful Cluster)	35
Definition	35
Assessment Measures.....	35
Auditory Processing.....	35
Phonemic Awareness	35
Functional Implications	35
Instructional Goal.....	36
Instructional Considerations.....	36
Software Characteristics	36
Recommended Software.....	37
Achievement Deficits	39
Basic Reading Skills	39
Assessment Measures.....	39
Functional Manifestations	39
Instructional Goal.....	40

Instructional Considerations.....	40
Software Characteristics	40
Recommended Software.....	41
Reading Comprehension & Fluency.....	43
Assessment Measures.....	43
Functional Manifestations	44
Instructional Goal.....	44
Instructional Considerations.....	44
Software Characteristics: Reading Comprehension.....	45
Software Characteristics: Vocabulary Development	46
Software Characteristics: Games or simulations which require reading comprehension	47
Recommended Software.....	47
Basic Mathematics Skills	49
Assessment Measures.....	49
Functional Manifestations	49
Instructional Goal.....	50
Instructional Considerations.....	50
Software Characteristics	50
Suggested Software.....	51
Mathematics Reasoning	53
Assessment Measures.....	53
Functional Manifestations: Mathematical Reasoning.....	53
Instructional Goal.....	54
Instructional Considerations.....	54
Software Characteristics	54
Recommended Software.....	55
Basic Writing Skills.....	57
Assessment Measures.....	57
Functional Manifestations: Spelling	57
Instructional Goal.....	57
Instructional Considerations.....	58
Software Characteristics: Spelling.....	58
Suggested Software: Spelling	59
Functional Manifestations: Writing Mechanics and Editing	60
Instructional Goal.....	60
Instructional Considerations.....	60
Software Characteristics: Writing Mechanics and Editing.....	60
Recommended Software: Writing Mechanics and Editing.....	61
Written Expression	63
Functional Manifestations	63
Instructional Goal.....	63
Instructional Considerations.....	63
Software Characteristics	64
Recommended Software.....	65

Phoneme/Grapheme Knowledge (WJ III Achievement Cluster).....	67
Definition	67
Assessment Measures.....	67
Functional Implications	67
Examples.....	67
Instructional Goal.....	68
Instructional Considerations.....	68
Software Characteristics	68
Recommended Software.....	69
Oral Language (WJ III)	71
Assessment Measures.....	71
Functional Implications	71
Instructional Goal.....	72
Instructional Considerations.....	72
Software Characteristics (Verbal)	73
Software Characterisitics (Vocabulary)	73
Recommended Software.....	74
References	77
Software References	79
Academic Challenge Cup	79
Ancient Wisdom.....	79
Brain Fitness Program	79
Building Perspective Deluxe	79
C ⁶ A ³ BI (Coastline Community College Comprehensive Cognitive-Retraining Curriculum for Adults and Adolescents	80
Compensatory Memory Strategies	80
Conditional Statements.....	81
Cornel Critical Thinking Test	81
Developing Critical Reading Skills	82
Earobics	82
Editor in Chief	82
Essay Punch.....	82
Factory Deluxe.....	83
Fast For Word Literacy.....	83
Fast For Word Literacy Advanced.....	83

Fast For Word Reading 1,2,3,4 and 5	84
Focus on Grammar (Basic & Intermediate).....	84
Grammar Fitness.....	84
Grammar Games	85
Grammar Shape Up.....	85
Inspiration.....	85
Lindamood Phoneme Sequencing Program & Seeing Stars CD-ROM Series ...	86
Locutour Attention and Memory vol 1	86
Locutour Literacy.....	86
Math Cad 7 Standard	87
Math Expert	87
Math Playground	87
Mavis Beacon Teaches Typing.....	87
Memory Challenge	88
Mind Benders	88
Modumath.....	88
Parrot Chunking.....	89
Paragraph Punch.....	89
Parrot Memory demo.....	89
Pre-Algebra Shapeup	90
Puzzle Master	90
Reading Shapeup.....	91
Revenge of Logic Spiders.....	91
Timez Attack.....	91
The Time Warp of Dr. Brain	92
Thinkanalogy.....	92
Trig Explorer.....	92
Ultimate Speed Reader.....	93
Vocabulary Fitness	93
Volcanoes	93
Voyage in Egypt.....	93

Word Problem Shapeup 94

Word Q 94

 Table 1.1: Cognitive processing areas capabilities comparison between software,
 part 1. 95

 Table 1.2: Cognitive processing areas capabilities comparison between software,
 part 2. 96

 Table 2.1: Achievement processing areas capabilities comparison between
 software, part 1. 97

 Table 2.2: Achievement processing areas capabilities comparison between
 software, part 2. 98

Introduction

In 1987, standardized assessment practices for identification of students with Learning Disabilities (LD) were adopted by the California Community College system. This process has provided invaluable assistance in assuring that the unique educational needs of students with learning disabilities are identified and addressed.

In 1993, the HTCTU, in conjunction with a statewide team of Learning Disabilities and High Tech Center specialists from the California community colleges, developed a guide entitled Selecting Software for Students with Learning Disabilities. The purpose of this guide was to match appropriate computer-assisted instructional software to the learning needs of students with specific deficits.

For several years, this guide served its purpose well; however, as new software was introduced and old software discontinued, a need arose to update this guide to reflect these changes. As with the earlier version, the purpose of the updated guide is to provide instructors with information necessary to evaluate the content and instructional effectiveness of any software program relative to the needs of students with learning disabilities.

Although some specific software is identified, these programs should be viewed as prototypic examples rather than prescriptive recommendations. This guide is not intended to be a simple software “cookbook,” but rather as the next step in the ongoing process of learning to identify and use educational software in specific, instructionally effective and creative ways. It is a part of the process of bringing technology into the classroom and enhancing the learning process for LD students.

In consultation with California community college LD testing specialists, assessment information from the Wechsler Adult Intelligence Scale-III (WAIS-III), the Wide Range Achievement Test-3 (WRAT-3), the Woodcock Johnson III Tests of Cognitive Abilities and Tests of Achievement, and the Wechsler Individual Achievement Test-II (WIAT-II) were identified as appropriate sources of information about learning deficits which could be matched to currently available software. These identifiable cognitive and achievement deficit areas have been used as the organizational framework for this guide. Each area has its own chapter which is divided into assessment and software sections.

The Deficit Areas

The deficit areas were divided into two broad categories, cognitive and achievement:

Cognitive

- Long Term Retrieval
- Short Term Memory/Working Memory
- Processing Speed
- Auditory Processing
- Visual Spatial Thinking/ Perceptual Organization
- Comprehension-Knowledge/Verbal Comprehension/Verbal Reasoning
- Fluid Reasoning and Abstract Reasoning
- Phonemic Awareness

Achievement

Broad Reading

- Basic Reading Skills
- Reading Comprehension & Fluency

Broad Math

- Basic Mathematics Skills
- Mathematics Reasoning & Fluency

Broad Written Language

- Basic Writing Skills
- Written Expression & Written Language Fluency

PreReading

- Phoneme/Grapheme Awareness
- Oral Language (Receptive and Expressive)

Special Considerations

The assessment section contains:

1. brief descriptions of the specific measures used to assess a given cognitive or achievement area, and
2. descriptions of the effects such deficits are likely to have on students' academic performance and ability to function in a college environment.

The software section contains:

1. the instructional goals which the software must achieve in addressing the effects of the targeted learning deficit;
2. a review of instructional considerations summarizing the wisdom, teaching experience, pragmatic skills and general working knowledge of the specialists who contributed to this guide and who have direct experience with assistive technology for the deficit area under discussion;
3. a description of the software characteristics, e.g., instructional design, methodology, learning levels, information feedback, use of repetition, color, sound or graphics, needed to work effectively with a particular learning deficit. Note: in many instances description of the unique importance and use of a basic software characteristic is also included; and
4. software examples providing specific titles of programs which demonstrate the characteristics of software required for a particular deficit area. Note: in some instances no single title meets all of the requirements, so a selection of program types, which together meet the requirements, has been assembled.

Assistive software instruction and technology can be useful and effective teaching/ learning tools when incorporated properly into a larger array of instructional activities. Productive use of this software requires that the instructors have a clear understanding of specific instructional goals for students and how the software will support the achievement of all or part of those goals.

Effective use of software, in general, requires an in-depth knowledge of each software program. In focusing on a deficit area, the instructors may often select only a single exercise from a larger program or a series of programs, each of which meets some portion of the overall instructional goal.

Instructors should provide students with an explanation of the purpose of the software, help students implement learning strategies, monitor progress, and make adjustments in program parameters and instructional goals as needed. Effective use of instructional software engages both instructors and students in a mutually rewarding teaching/learning experience.

We are not suggesting that deficits can, or will be, “fixed” through the use of software. Neither are we proposing that software be casually selected and used on the basis of a single subtest score. Deficits to be addressed by software should be carefully identified through combinations of tests, subtests, and/or clusters

Computer software can provide highly specialized support for a wide range of students. We look forward to your comments and suggestions as you use this guide. The development of this text is an evolutionary process which will change as better technology becomes available and instructional methods are refined. We hope the revised edition of the guide will provide you with a useful tool for better utilizing the software resources you already have and for selecting new ones in the future.

General Guidelines

Determining the appropriateness of software for any given student or group of students requires many of the same skills instructors already use in evaluating instructional resources such as books, slides, video, handouts and audio tapes. Although the perception exists that evaluating software is very different from evaluating more traditional types of instructional media, in fact, the processes have a great deal in common.

The following guidelines provide instructors with the “ideal” general characteristics of instructional software. It is important to understand that the probability of finding a single software program which includes all of these characteristics is unlikely. More commonly, as with other resource materials, instructors will use portions of several programs to meet their instructional goals. When evaluating and comparing software, the instructor might use the following questions.

Organization

- Does the software provide a clearly defined set of goals and objectives and a series of activities or presentations which lead to their achievement?
- Does each module or lesson focus on a particular topic, idea, or lesson?
- Does the software provide an organizational structure that allows easy access to any exercise, example or instructional component?
- Does the program provide clear and simple instructions for students and instructors on-line and in an accompanying manual?
- Does the software provide a data collection mechanism that automatically captures pertinent information, allows for manual input, and displays, prints and stores (in graphs, charts and text) cumulative data showing areas of student progress and difficulty?
- Does the program provide authoring components that are easy to use (for editing and entering new data)?

Methodology

- Does the software provide a broad perspective of different cultures through examples that include students and student interests of various ethnic and racial backgrounds?
- Does the software provide a variety of instructional formats and/or methods that take into account diversity in student learning styles?
- Does the software provide effective sequencing of information?
- Does the software link the presentation of new information to evidence of success with previous learning tasks?
- Are the quiz and review components linked to the program goals and objectives?
- Are the vocabulary, sentence structure and content of the software appropriate to the age group with which it will be used?
- Does the software provide relevant and up to date content material and exercises?
- Is the feedback provided by the software meaningful? Does feedback about incorrect responses provide useful information about the type of error, how to make corrections and how to proceed through the remaining material?
- Does the feedback support the learning process, promote further interaction with the software, and avoid using methods a student may find threatening, embarrassing, or intimidating?
- Does the software provide options for automatic or manual progression or regression through the hierarchy of content, as well as a variety of presentation styles, based on student responses?
- Does the software use graphics, sound, buttons, etc. in ways which enhance (not distract from) the program's instructional objectives?
- Does the program incorporate screen designs and text display that are dynamic enough to be pleasing to the student's eye, sustain interest in the program and contribute to the instructional objective?
- Does the software provide control options that allow the student or instructor to set graphic, text, sound and motion attributes, such as color combinations, size of fonts, volume, and playback features?

- Does the program provide easy-to-use supportive materials and documentation for students and teachers such as manuals, activity sheets and handouts?
- Does the program provide maximum compatibility with system software and assistive computer hardware and software?

Cognitive Deficits

Long Term Retrieval

Definition

Long Term Retrieval (LTR) is the process by which information is transferred from immediate awareness and stored for later retrieval. This cluster measures the efficiency and fluency with which an individual can retrieve information that has been previously stored. LTR is not the same as long term memory, which reflects the depth of the individual's acquired knowledge. In other words, LTR measures "how" information is stored; long term memory measures "what" is stored.

Assessment Measures

In the WJ III, the LTR cluster comprises two tests:

Visual-Auditory Learning (Test 2) which measures ability to learn, store, and retrieve associations;

and

Retrieval Fluency (Test 12) which measures ability to fluently retrieve information from stored knowledge.

The WAIS-III does not measure Long Term Retrieval.

Functional Implications

Those who are strong in LTR demonstrate ability to make associations enabling them to easily retain, retrieve, and connect pieces of information or concepts.

If a student demonstrates an LTR deficit, she/he may have difficulty connecting previously learned information with newer, related information. S/he may also have difficulty efficiently retrieving stored information. An individual with an LTR deficit may require frequent repetition to learn new information and may be inconsistent in recalling that information at a later time.

Examples:

1. A student may have learned all the formulas required for a math class. However, the student is unable to retrieve the

appropriate formula needed to solve a particular problem because of faulty storage of associations.

2. A student in a biology class must identify slides on a lab test. Although the student has stored information about the parts of a cell, the student is unable to retrieve this information quickly enough to complete the test in the allotted time.
3. In an art history class, students are shown slides for a few seconds and required to identify the artist and the style period. A student with an LTR deficit might recognize the painting but not be able to connect the other information within the time limit.

Instructional Goal

Students will apply memory strategies (mnemonics) in a variety of contexts to improve information storage and retrieval.

Instructional Considerations

A vast body of recent research in memory and cognition shows that effective long-term retrieval is dependent on the quality of semantic relations that exist between old and new learning. The software and hardware products described later in this document enhance one's ability to create connections between discrete segments of information, whether auditory or visual, so that they can be stored and recalled more efficiently, thereby enhancing long-term retrieval. It is unclear whether software exercises alone can improve long-term retrieval. Mnemonic strategies need to be taught in conjunction with software use, and may include:

- Verbal/visual associations
- Chunking
- Loci
- Peg System
- Personalization
- Strategies to organize information for more effective retrieval

Adjunct tasks associated with software practice should be used to encourage functional application of the strategies learned (for example, students develop a portfolio demonstrating their successful functional/academic use of retrieval strategies).

Software Characteristics

Feedback should be educational.

Frequent on screen scoring allows students to learn from their responses. There should be an opportunity to try a task more than once with minimal penalty. Cues should be provided if responses are repeatedly inaccurate. Students should be able to determine their most effective learning modality by comparing scores on a variety of tasks. The software should accept close approximations of spelling where accuracy is not essential.

Software tasks must provide practice with a limited number of easily defined strategies.

Practice with a limited number of strategies enables a student with memory problems to clearly understand the nature of the strategies being developed and used.

Tasks should be presented in order of increasing complexity.

It is critical for students with memory problems to begin developing memory strategies at a simple level before moving to more complex levels. Tasks of increasing complexity provide motivation and an opportunity to self-monitor for effective application of the strategy being practiced. In this way mastery of a particular memory strategy may be achieved.

Format should be motivating.

Memorization can be boring. Computer graphics, auditory and visual reinforcers, or a game format provide motivation for continued practice.

Reading and spelling tasks should be matched to the student's abilities.

Students should be able to attribute their scores to memory practice only. Errors in reading or spelling confuse and frustrate students and are unrelated to the memory task itself.

An authoring component should be available when appropriate.

Authoring components which allow students to develop visual memory aids (e.g., flash cards, lists, outlines for academic coursework) are particularly useful. Learning has a greater chance of occurring when activities can be applied in real life situations.

Potential for distraction from the task should be provided.

Distraction is a primary hindrance to the ability to memorize successfully. Software-generated distractions provide the opportunity for students to learn how to overcome this problem.

Recommended Software

Fast ForWord Literacy/Literacy Advanced (Scientific Learning)

<http://www.scilearn.com/products/index.php>

This program uses a game format to systematically train auditory processing skills to improve listening and language processing (as a basis for reading and functional listening skills) from the phoneme to short paragraph level. The 50 minute protocol strongly recommends 5 days a week until all skills are mastered (approx. 6-8 weeks for most students).

Literacy lays the basic foundation and Literacy Advanced gives the students new ways to build the same skills as the information they process gets more complex and moves into more reading.

The research basis and individualization of the rate of delivery of the stimuli (via internet connection) to each student to keep them successful, but challenged and motivated, makes this the gold standard for software programs.

Students have to listen, watch and respond using a keyboard or mouse so other integrated skills are built as well, such as visual processing and visual memory, even though they are not a direct focus.

This relates to long term retrieval because students develop strategies that have to be implemented daily while the stimuli move faster. Students do well if they remember and replicate strategies that have worked for them in the past. Part of the instructor “monitoring” includes discussing, building, and reinforcing the use of strategies that are effective in raising scores. This language can then be transferred to other types of storage and retrieval strategies.

Compensatory Memory Strategies: Chunking (Parrot Software)

<http://www.parrotsoftware.com>

Chunking has lists of items that can be controlled in number of items and types of categories. It is simply a task in grouping by category and then remembering through either recognition from a list, or by typing in responses. It does not go further in developing chunking techniques. It is best used as a starting point for the concept of grouping, and then true chunking techniques for better and more functional use can be provided by non-computerized instruction.

Memory Challenge (Critical Thinking Software)

http://www.criticalthinking.com/series/094/index_c.html

Memory Challenge uses a visual memory process involving shapes and color. Instructor can control number of items, number of different shapes used, and number of different colors used. Presentation time can be controlled, from one to 60 seconds. Unique to this program are controlled distractions, which can be used to challenge long term retrieval. The type of distractor (Blank, Visual, Question, None) and duration from 0 to 120 seconds can be controlled.

Brain Fitness Program (Posit Science)

<http://www.positscience.com/programs/buy.php>

Through adaptive training that is continuously customized for an individual user's brain performance, the training program clearly defines goals and shows progress history and achievements.

The training program stores complete training data and presents it in a user-friendly set of feedback/progress screens that occur at the end of each exercise and the end of each training session. In addition (optionally, at the user's request), the training program securely and confidentially uploads all training data where more detailed analyses and feedback can be performed by a phone call to Posit customer service.

The training program presents instructional material in printed form (for reading-focused learning styles), in example form (for auditory learners), and through practice (for experiential learners); in addition the training exercises continuously adapt to the brain performance of each individual learner thus maximizing the learning that an individual gains.

Short-Term Memory and Working Memory

Definition

These interrelated memory areas involve immediate storing of information, but they serve distinct roles in processing and eventual comprehension of information. Behavior aspects such as inattention, anxiety, and poor concentration may affect both short-term memory (STM) and working memory (WM).

Short-term memory is an element of cognitive efficiency or automatic processing. Closely related to memory span, STM requires holding information for a few seconds and then using it before it is lost or stored for future use. From this view, STM may be considered a first step to “permanent” storage.

In contrast, Working Memory involves not only memory span, but also manipulation of information that is in immediate awareness to solve given problems. Thus, WM has multiple components such as sequential processing, number ability, and executive processing or planning.

Assessment Measures

Short-Term Memory

On the WJ III, the STM cluster includes two tests:

Numbers Reversed (Test 7)

and

Memory for Words (Test 17).

Both tests measure memory span, although Numbers Reversed may be considered a measure of WM. The WAIS-III does not specifically measure STM.

Working Memory

On the WAIS-III, three tests comprise the Working Memory Index:

Arithmetic (Test 6); Digit Span (Test 8);

and

Letter-Number Sequencing (Test 13) .

These tests require listening to and quickly storing information in

STM and then moving to WM where mental manipulation and visualization of information is needed. Additionally, Arithmetic requires recognizing specific processes (e.g., adding, subtracting) to use.

On the WJ III, WM includes:

Numbers Reversed (Test 7);

and

Auditory Working Memory (Test 9).

The latter involves mentally dividing information into two groups (numbers and words) and putting them in ordered sequence.

Functional Implications

People with good STM/WM often do well with rote memorization as well as being able to follow lengthy oral directions. They generally do well grasping lecture information.

A student with either a short-term or working memory deficit may encounter difficulty holding information long enough either to mentally manipulate it or to comprehend it. As a result, the student may struggle to relate the information to on-going situations (e.g., lectures) or may grasp only bits and pieces of what she/he hears. Thus, the student may not proficiently process, comprehend, and/or store information.

Examples

1. During a large lecture class, a professor orally presents an extensive list of terms for students to look up and learn for the next class. Because the professor does not write the information on the board or provide a written list, the student with STM/WM deficit may miss several terms.
2. When a student with STM/WM deficit takes a math exam, he/she may need extended time because without writing down each step of the problems he/she cannot remember what calculations have been completed.
3. A manager of a sports supply store directs an employee to display specific sizes and styles of shoes. Without a written list, the employee with STM/WM deficit may confuse or not remember the size and style numbers.

Instructional Goal

For short-term memory, students will briefly retain and then retrieve information. For working memory, students will provide responses that reflect their ability to retain and mentally manipulate information.

Instructional Considerations

Modality of presentation and modality required in responding need to be considered. Students may exhibit different strengths with verbal as opposed to visual information.

Recognition of information that was retained (e.g. choosing from a list) is easier than retrieval of the specific information. This should be considered in task difficulty and in determining progress.

Within specific programs, do not increase difficulty levels too quickly. Improvements may be seen with specific information in specific programs, and not accurately reflect functional improvements.

It may be helpful to use software to present and practice mnemonic strategies with this material (see long-term retrieval). Academic materials used in the software should be within the student's abilities.

Software Characteristics

Format should be motivating.

The task of this software is to train students to attend to multiple stimuli and/or stimuli which increases in complexity and length. Because this type of memory practice can be boring, it is important that software provide visual or auditory reinforcement to motivate students to continue practicing. Game formats are often the most successful in generating motivation, but the student must be taught to apply the skills she/he is learning to every day activities in and out of school.

Software should require mastery before student can advance to a higher level.

Confusion and frustration will result if a student advances before she/he has mastered the current memorization task. Often the instructor must monitor students to be sure that this software is being used properly.

Software should provide a variety of activities.

By working in a variety of activities, a student can monitor the ways in which her/his mind functions in the context of these different activities. More importantly, these activities provide the student with experiences which reveal how her/his particular mind works. Some tasks will be easier than others depending upon the individual student. Software scores can be used as tools to illustrate a student's learning strengths and weaknesses.

Software should provide frequent feedback.

Short segments with feedback provided allow the student to take in the information they are learning about themselves more effectively. If a task is too long or complex this benefit will be compromised by frustration due to repeated errors.

Reading and spelling tasks should be matched to the student's abilities.

Students should be able to attribute their scores to memory practice alone. Errors in reading or spelling contaminate information the student needs to learn about efforts to improve short term memory.

Recommended Software

Fast ForWord Literacy/Literacy Advanced (Scientific Learning)

<http://www.scilearn.com>

This program uses a game format to systematically train auditory processing skills to improve listening and language processing (as a basis for reading and functional listening skills) from the phoneme to short paragraph level. The 50 minute protocol strongly recommends 5 days a week until all skills are mastered (approx. 6-8 weeks for most students).

Literacy lays the basic foundation and Literacy Advanced gives the students new ways to build the same skills as the information they process gets more complex and moves into more reading. The research basis and individualization of the rate of delivery of the stimuli (via internet connection) to each student to keep them successful, but challenged and motivated, makes this the gold standard for software programs.

Students have to listen, watch and respond using a keyboard or mouse so other integrated skills are built as well, such as visual processing and visual memory, even though they are not a direct focus.

NOTE: Posit Science's Brain Fitness program is based on the same science and foundation as Fast ForWord. The decision regarding when to use FFW Literacy vs. Brain Fitness hinges on reading background. Brain Fitness would be primarily appropriate for people who have lost listening and reading ability due to head injury, stroke, or aging. FFW Literacy/Literacy Advanced is for people who are very low or poor readers (usually due to life long cognitive and processing deficits) and never had the reading foundation.

Locutour Attention/Memory - Vol 1, 2, and High Level (Learning Fundamentals)

<http://www.locutour.com/products/product.php?id=1>

This program helps auditory and visual memory by providing a variety of memory and attention exercises that range from simple to complex.

Earobics (Cognitive Concepts)

<http://www.earobics.com>

This program provides auditory memory and auditory processing exercises for student practice.

Memory for Directions (Parrot Software)

<http://www.parrotsoftware.com>

Memory for Directions helps auditory and visual memory by giving verbal or written directions (1-3) to click and drag specific images to locations (above, below, right/left) of other images.

Listening Skills (Parrot Software)

<http://www.parrotsoftware.com>

Listening Skills helps auditory short term memory by giving verbal directions to color specific shapes on top, middle, or bottom rows. It can be set to give 1-5 directions. Responses can be self-corrected. Directions can be repeated.

Logical Thinking (Parrot Software)

<http://www.parrotsoftware.com>

Logical Thinking has a short-term memory component using directions containing if/then statements with and/or/not. Level of complexity can be controlled involving right/left/above/below, color, and odd/even numbers to identify where an object should be located. All instructions are written, but disappear once the image is picked up to be dragged to its location.

Visual Pattern Memory (Parrot Software)

<http://www.parrotsoftware.com>

Visual Pattern Memory is more purely visual short term memory. Number of items and duration displayed can be controlled. Items appear in their locations within a grid for the specified duration. The entire grid is filled with pictures and the ones displayed earlier are to be selected.

Memory Challenge (Critical Thinking Software)

http://www.criticalthinking.com/series/094/index_c.html

Memory Challenge uses a visual memory process involving shapes and color. Instructor can control number of items, number of different shapes used, and number of different colors used. Presentation time can be controlled, from one to 60 seconds. Unique to this program are controlled distractions. The type of distracter (Blank, Visual, Question, None) and duration from 0 to 120 seconds can be controlled.

Brain Fitness Program (Posit Science)

<http://www.positscience.com/programs/buy.php>

Through adaptive training that is continuously customized for an individual user's brain performance, the training program clearly defines goals and shows progress history and achievements.

The training program stores complete training data and presents it in a user-friendly set of feedback/progress screens that occur at the end of each exercise and the end of each training session. In addition (optionally, at the user's request), the training program securely and confidentially uploads all training data where more detailed analyses and feedback can be performed by a phone call to Posit customer service.

The training program presents instructional material in printed form (for reading-focused learning styles), in example form (for auditory learners), and through practice (for experiential learners); in addition the training exercises continuously adapt to the brain performance of each individual learner thus maximizing the learning that an individual gains.

Processing Speed Clusters

Definition

Processing Speed is the ability to execute simple, relatively automatic visual-motor tasks and to maintain attention when time is an essential component of the tasks. However, although processing speed tasks on the surface are relatively automatic, the WAIS-III and WJ III subtests include several components of this ability: psychomotor speed, mental speed, perceptual speed/visual motor coordination, semantic processing, visual memory, and planning ability. Additionally, processing speed tests may reflect issues with compulsiveness and motivation.

Assessment Measures

The WAIS-III Processing Speed cluster includes:

Digit Symbol-Coding and **Symbol Search**;

as well as two supplemental tests: **Digit Symbol-Copy** and **Digit-Symbol Incidental Learning**.

Coding focuses primarily on psychomotor speed, but it also includes visual memory and planning ability.

Symbol Search taps mental speed—the ability to quickly discern similarities and differences among visual stimuli.

The supplemental tests help discern differences between perceptual accuracy/speed and visual memory.

The WJ III Processing Speed cluster includes:

Visual Matching (Test 6)

Which examines ability to discriminate between visual (number) patterns.

and

Decision Speed (Test 16)

Which requires making quick conceptual decisions (i.e., how two things are related, not just how they look alike.)

Functional Implications

Students with good processing speed quickly interpret visual symbols and may be adept at attending to details.

A student with a processing speed deficit may encounter difficulty with tasks that require rapid, efficient visual scanning and interpretation of visual stimuli, including letters, numbers, and symbols. As a result, when time limits are imposed, a student may sacrifice comprehension for speed when reading, confuse numbers and/or symbols on math problems, or not complete exams within standard time limits.

Examples

1. A student with a processing speed deficit correctly completes only 20 of 40 multiple choice questions on a history test. Each question has five answer choices, and the answer is to be recorded on a Scantron. Because of the multiple tasks involved—reading the questions and answer choices, matching the answer choice to the corresponding letter space on the Scantron, and making sure the space is on the correct line—the student works slowly and carefully checks responses. Even though he/she correctly answered the 20 questions, the student fails with a grade of 50%.
2. When a student with a processing speed deficit takes a math exam, he/she struggles to distinguish differences between numbers and symbols that are similar. Without extra time the student may make careless errors as well as misinterpret the symbols.
3. The morning of a sale, an electronics store employee is given a list of sale items with their reduced prices, and he/she is asked cross out the original prices and to write the sale prices on the item tags. If the employee has a processing speed deficit, he/she may have difficulty quickly and efficiently carrying out this task.

Instructional Goal

Students will increase their ability to perform automatic cognitive tasks.

Instructional Considerations

Task selections should consider addressing rapid intake and/or processing of information and not merely rapid responding. It is important to have programs in which information is presented for a controllable short time as well as programs that motivate the student to respond before negative consequences occur.

A variety of activities should be available in order to facilitate generalization.

Varied tasks are also needed in order to encourage rapid processing of not only visual perceptual or auditory information, but also academic information.

Time-based feedback or data collection procedures are preferred, rather than documenting only levels of achievement.

Software Characteristics

A wide range of speed levels should be available so that students can work on content at or near ability levels.

Software for processing speed should offer a wide range of speed levels in order to allow success for slower students and challenges for higher functioning students. Content difficulty should be within or near students' abilities so the task focus is primarily on increasing the speed of accurate responses (and not on error responses which result from poor reading skills). Software with an open-entry structure for task selection allows students to begin at or near the speed level they find challenging.

Response process should reflect rapid processing of information.

The response process should reflect that the student has processed the information, and processed it accurately. Students should not be penalized for a slow keyboard entry rate. If the software objective is reading more quickly, speed and accuracy of the response (e.g., keyboard entry of word(s) that were read) should not be an issue.

Software should include a timing component.

A timing component should monitor students' speed of task completion and/or challenge them to work faster. It can do this in at least four ways:

- presenting visual stimuli for a set duration;
- discontinuing tasks when a set duration for responding has

been exceeded;

- documenting response time as feedback; or
- providing a “chase” environment to motivate the student to complete the task before negative consequences occur.

Recommended Software

Fast ForWord (FFW) Literacy/Literacy Advanced (Scientific Learning)

<http://www.scilearn.com>

This program uses a game format to systematically train auditory processing skills to improve listening and language processing (as a basis for reading and functional listening skills) from the phoneme to short paragraph level. The 50 minute protocol strongly recommends 5 days a week until all skills are mastered (approx. 6-8 weeks for most students).

Literacy lays the basic foundation and Literacy Advanced gives the students new ways to build the same skills as the information they process gets more complex and moves into more reading.

Students have to listen, watch and respond using a keyboard or mouse so other integrated skills are built as well, such as visual processing and visual memory, even though they are not a direct focus.

Locutour Attention/Memory (Learning Fundamentals)

<http://www.locutour.com/products/product.php?id=1>

Visual processing speed will be trained any time students have to watch and respond. On this program, students have to attend and respond in a timely fashion or they will lose points.

Mavis Beacon Teaches Typing (Broderbund)

<http://www.broderbund.com>

This trains visual-motor processing speed because students are watching the model on the screen and typing along with it at faster speeds and increasing levels of complexity. Motivation can be maintained as the instructor/tutor reminds the student of the practical application of these skills.

Ultimate Speed Reader (Smart Kids Software)

<http://www.smartkidssoftware.com/nddav41.htm>

This program facilitates reading speed, but it also works on processing speed through controlling the presentation speed of 2-4 letters or 2-4 words, and then untimed multiple choice responses. Number of items and speed presented can be controlled. Accurate responses speed up presentation speed, while inaccurate responses yield representation of the same items at a slower speed.

Brain Fitness Program (Posit Science)

<http://www.positscience.com/programs/buy.php>

Through adaptive training that is continuously customized for an individual user's brain performance, the training program clearly defines goals and shows progress history and achievements.

The training program stores complete training data and presents it in a user-friendly set of feedback/progress screens that occur at the end of each exercise and the end of each training session. In addition (optionally, at the user's request), the training program securely and confidentially uploads all training data where more detailed analyses and feedback can be performed by a phone call to Posit customer service.

The training program presents instructional material in printed form (for reading-focused learning styles), in example form (for auditory learners), and through practice (for experiential learners); in addition the training exercises continuously adapt to the brain performance of each individual learner thus maximizing the learning that an individual gains.

Visual-Spatial Thinking and Perceptual Organization

Definition

These closely related areas focus on ability to think in pictures, to store and recall visual details, and to analyze relationships between visual patterns. Although the WJ III Visual-Spatial Thinking and WAIS-III Perceptual Organization individual tasks are quite different in nature on the surface, they share concepts involving simultaneous processing (interpretation of more than one image at a time), speed of mental processing (some tests are timed), synthesis (part-to-whole relationships), and some trial and error learning. Additionally, since both clusters are based on non-verbal reasoning, neither involves extensive prior learning nor are they affected by a person's language background such as ESL.

Assessment Measures

The WJ III Visual-Spatial Thinking cluster (Gv) includes:

Spatial Relations (Test 3) which measures ability to use visualization.

and

Picture Recognition (Test 13) which is a visual memory task.

Three supplemental tests further examine visual thinking:

Visual Closure (Test 22)

Block Rotation (Test 23)

and

Planning (Test 19)

These tests also examine the ability to recognize whole pictures when pieces are missing, to recognize alike geometric shapes when one is rotated, and to formulate plans to trace patterns (visualization).

The WAIS-III Perceptual Organization index includes:

Picture Completion (Test 1)

Block Design (Test 5)

and

Matrix Reasoning (Test 7).

Object Assembly (Test 14) is an optional test that may be administered and substituted for a spoiled performance test.

These tests address simultaneous processing, spatial visualization, part-to-whole relationships, non-verbal abstract reasoning, and interpretation of visual details and their importance.

Functional Implications

People with strong visual spatial and perceptual organization skills are generally drawn to fields such as art, geography, and engineering. They are able to use their strengths to manipulate and comprehend visual patterns.

A student with weak visual-spatial thinking or perceptual organization abilities may encounter difficulty in the following areas:

- a) solving problems where vocabulary is limited,
- b) easily recognizing visual details, and
- c) interpreting patterns such as in geography, geometry, and art.

Thus, the student may overlook or misinterpret essential details on maps or charts, or have difficulty aligning numbers or organizing graphs.

Some students with poor visual memory may struggle to recall what they have seen without several repetitions.

Finally, some people may have problems with directionality such as differentiating between north- east- south -west, as well as judging distance and following directions to get from one place to another.

Examples

1. A student plans to enroll in an Oceanography class and its accompanying lab. Part of the curriculum involves identifying (on maps) different ocean currents and the latitudes at which they are generally positioned. Because the student has problems with north-east-south-west directionality, he/she will need to develop effective learning strategies that facilitate mastery of the course content.
2. Part of an art history exam involves viewing slides of several types of art and identifying the artists and the periods in which the art was painted. Each slide is presented for two minutes. For a student with visual

processing deficits, the time limit may interfere with his/her ability to adequately process, store, and recall the required information.

3. Spatial orientation difficulties may result in difficulty traveling from one location to another without written instructions that specify names of streets to turn on or designate how many stop signs or traffic signals are between locations. A person with such problems also may need to develop and employ strategies to facilitate recognition of left and right such as on which arm he/she wears a watch.

Instructional Goals

Practice strategies to improve organization of visual data leading to a product.

Practice strategies to improve discrimination of increasingly subtle variations in visual sequences, spatial relationships among objects, and orientation of objects.

These software goals combine strengthening visual perceptual skills and thoughtful, efficient problem solving.

Instructional Considerations

Software provides the opportunity for improvement of visual perceptual skills as well as cognitive mediation of (thinking about) visual perceptual tasks when the solution is not readily perceived.

When concentrating on academic tasks (e.g. writing using a word processor) students can take advantage of strategies to compensate for visual perceptual weaknesses. These strategies include adjusting screen colors, adjusting text font, adjusting text size, adjusting format of work on the monitor, enlarging the cursor, using copy holders with line guides, and using on-line reference and personal management tools.

Software Characteristics

The software text and graphics must be easily perceived.

The monitor must have clear resolution (e.g. smooth characters, no bleeding colors, no bouncing graphics, no obvious flicker) so the quality of the images will not interfere with perception of the material.

There should be clear, minimal on-screen directions.

Students should not be distracted from visual perceptual tasks by confusing or difficult to read directions.

The software should provide carefully sequenced activities.

It is especially important that software activities be sequenced to help students avoid sensory overload and confusion, maintain their motivation, and provide enough challenges to stretch their skills.

Responses should reflect decisions regarding organization or discrimination of visual perceptual data.

Success with the software must depend on using visual perceptual skills.

Recommended Software

Factory Deluxe (Sunburst Software)

<http://store.sunburst.com/ProductInfo.aspx?itemid=176616>

This software challenges visual thinking and organization through a series of increasingly complex construction tasks. The program teaches separate processes, and then requires the user to appropriately sequence the processes to achieve a finished product. Level of difficulty can be controlled.

Building Perspective Deluxe (Sunburst Software)

<http://store.sunburst.com/ProductInfo.aspx?itemid=176623#complete>

Building Perspective develops 3-dimensional spatial thinking and reasoning by identifying items when a group of them is viewed from different perspectives (above, and on each of four sides). Size of the group can be controlled.

Puzzle Master (EGames)

<http://www.egames.com/gamepage.php?id=276>

Puzzle Master develops perceptual analysis and awareness of visual detail. It is a program of jigsaw puzzles that can be controlled for number of pieces and shape of pieces for complexity.

Brain Fitness Program (Posit Science)

<http://www.positscience.com/programs/buy.php>

Through adaptive training that is continuously customized for an individual user's brain performance, the training program clearly defines goals and shows progress history and achievements.

The training program stores complete training data and presents it in a user-friendly set of feedback/progress screens that occur at the end of each exercise and the end of each training session. In addition (optionally, at the user's request), the training program securely and confidentially uploads all training data where more detailed analyses and feedback can be performed by a phone call to Posit customer service.

The training program presents instructional material in printed form (for reading-focused learning styles), in example form (for auditory learners), and through practice (for experiential learners); in addition the training exercises continuously adapt to the brain performance of each individual learner thus maximizing the learning that an individual gains.

Brain Fitness Program was specifically designed to be engaging and enticing to its target users; it presents the scientifically rigorous training content in the context of engaging and challenging game-like exercises. The user interface was designed with the target user (older adults) closely in mind. The graphics and sounds are part of an integrated science-based reward system designed specifically to engage and enhance brain systems crucial for the control of learning and memory including attention, reward, and novelty-detection.

Knowledge and Verbal Comprehension

Definition

Comprehension-Knowledge (WJ III) and Verbal Comprehension (WAIS-III) involve crystallized or learned knowledge, including breadth of vocabulary and general information, and the ability to reason with this information. This broad ability is important in all areas of academics. Vocabulary is also deemed an important predictor of academic potential.

Assessment Measures

Comprehension-Knowledge on the WJ III includes two tests:

Verbal Comprehension (test 1), which comprises picture vocabulary, synonyms, antonyms, and analogies.

General Information (test 11).

Verbal Comprehension on the WAIS-III includes:

Vocabulary (test 2)

Similarities (test 4)

Information (test 6).

Functional Implications

People who display strength in these areas have well developed vocabulary and a good store of learned information. They are also generally good communicators.

Because vocabulary, general knowledge, and verbal reasoning are essential in almost all academic areas, a student with deficits in these areas may encounter difficulty with tasks such as reading comprehension, taking written exams, writing essays, following oral directions, mastering lecture material, and expressing thoughts orally. Additionally, deficits in these areas often reflect long-term memory weakness.

Examples

1. An employee is required to pass a written test based on a reading assignment about different workplace situations. Because the employee has deficits in vocabulary, she does not comprehend all the details she reads and then cannot

easily answer the written questions.

2. A student is asked to write a term paper that argues whether 18 year-olds should/should not be allowed to consume alcohol. Because the student has weak verbal reasoning, his paper does not present arguments that clearly address the issue. Instead, he writes only why his friends think drinking is OK.
3. An anthropology professor gives a series of detailed lectures about a Southeast Asian culture but does not give a short review of each previous lecture. A student who has long-term memory deficits may have difficulty following the lecture because she needs review to help her recall what was learned in the previous lecture.

Note: Because this area of assessment is so broad, descriptions of functional behaviors and software considerations are broken down into two basic areas,

1. Vocabulary, and
2. Verbal (listening) comprehension

Instructional Goal (Vocabulary)

Students will increase written vocabulary at the single word level and categorize relationships among words.

Instructional Considerations (Vocabulary)

It should be noted that tests used to measure these skills require a verbal/oral response, while most computer software requires a written or motor response.

Software Characteristics (Vocabulary)

Objectives and content should be clearly organized.

Objectives for the development of vocabulary and word relationships should be functional and clearly stated. Whether by grade-level, by part of speech, or as survival vocabulary, its organization should be in agreement with the instructional objectives for these students.

Definitions should be clear and within students' reading abilities.

Content for vocabulary/word relationship tasks should offer a wide range of reading/spelling levels with instructions and definitions clearly within students' reading levels. The content of definitions is easily susceptible to cultural biases and should be reviewed with

students. It is suggested that new word lists be limited to no more than 20 per set. After mastery of each set, some integration of word sets may be helpful in generalization. An open-entry process allows students to begin at or near a challenging level.

Format should be interactive, with a variety of drill activities available.

Format is crucial in vocabulary development. An interactive instructional format for initial learning of new vocabulary or word relationships (as opposed to the display-only format of many programs) is beneficial prior to drill formats. A variety of activities (e.g. multiple choice, matching, sentence completion) not only accommodates different learning styles, but also facilitates generalization of word knowledge. Because many programs are drill-based, a motivating format assisted by appropriate graphics, is helpful.

Response processes should reflect knowledge of word meanings or relationships.

Opportunities for choice responses and single word entry responses should be available, but unless instructional objectives stress accurate spelling, the program should provide some assistance and/or accept a range of spelling accuracy in responses. When responses are inaccurate, the correct answer should be displayed.

Authoring component should be easy to use.

Entry of material relevant to students' current needs is the most functional use of these programs.

Spoken output is desirable.

The dual input of visual and spoken word production not only accommodates both auditory and verbal learners, it also assists in generalization of new vocabulary into spoken language.

Instructional Goal (Verbal Comprehension)

Students will demonstrate comprehension of increasingly complex verbal language concepts. Materials need to increase in length and complexity from single word to extended paragraph.

Instructional Considerations (Verbal Comprehension)

Although there is no commercially available software for lengthy material in this area directly, there are many emerging products in software for English as a Second Language (ESL) and at ESL

sites online. These allow for students to listen to more lengthy information through dialogues and lectures, some of which are academic in nature. Listening to task-specific directions (up to five steps) is available.

There are reading comprehension products that allow a spoken component to run simultaneously with the reading. For these to be purely auditory in nature, the monitor would need to be obscured, which would impact navigation of the program.

As content increases in length, students will need to utilize strategies to assist short and long-term retrieval in order to organize and retain information.

Software Characteristics (Verbal Comprehension)

Software content should reflect differing levels and types of complexity.

Material can increase in difficulty in many ways: in length, in grammatical complexity, and in the abstractness of its ideas. The software should effectively organize difficulty levels acknowledging these parameters.

Software content should be free from cultural bias.

Because grammatical structures and abstract ideas are easily susceptible to cultural biases, content should be reviewed with students before use.

Response processes should reflect comprehension.

If keyboard entry is required for response, students should not be penalized for spelling errors.

Feedback should be educational.

Opportunity for repeated attempts at correct answers is important in this area, as is identification and explanation of accurate responses. Ideally, material relevant to the correct answer should be highlighted (perhaps as cues), and there should be feedback to explain why inaccurate responses are in error.

Content should require association of ideas.

Tasks should require students to determine main ideas, make inferences, and/or draw conclusions.

Program content should be suitable for class discussion on the use of strategies for organization of material.

Extended verbal information needs to be organized in order to facilitate comprehension and retention. Strategies for organizing the material received can be reviewed before the task, as part of the task, and/or after the task.

Recommended Software

Fast ForWord Literacy/Literacy Advanced (Scientific Learning)

<http://www.scilearn.com>

This program uses a game format to systematically train auditory processing skills to improve listening and language processing (as a basis for reading and functional listening skills) from the phoneme to short paragraph level. The 50 minute protocol strongly recommends 5 days a week until all skills are mastered (approx. 6-8 weeks for most students).

Literacy lays the basic foundation and Literacy Advanced gives the students new ways to build the same skills as the information they process gets more complex and moves into more reading.

The research basis and individualization of the rate of delivery of the stimuli (via internet connection) to each student to keep them successful, but challenged and motivated, makes this the gold standard for software programs.

Students have to listen, watch and respond using a keyboard or mouse so other integrated skills are built as well, such as visual processing and visual memory, even though they are not a direct focus.

Vocabulary

Vocabulary Fitness (Merit Software)

http://www.meritsoftware.com/software/vocabulary_fitness/index.php

This program provides practice with feedback and explanations for commonly confused words used in context. The different units increase in difficulty.

Multiple Meaning Words 1 & 2 (Parrot Software)

<http://www.parrotsoftware.com>

These programs provide vocabulary practice with homonyms, both in generating one and then using each appropriately in context. There is no apparent increase in difficulty within programs or between them.

Verbal Comprehension

Listening Skills, Memory for Directions, & Conditional Statements (Parrot Software)

<http://www.parrotsoftware.com>

These programs all give verbal instructions to be completed, up to 3 steps in Memory for Directions, up to 5 steps in Listening Skills, and 1 step that increases in linguistic complexity in Conditional Statements. Memory for Directions can be verbal or written, while Conditional Statements can be verbal, written, or both.

Reading Shape-Up (Merit Software)

http://www.meritsoftware.com/software/reading_shape_up/index.php

When used in conjunction with Merit-Talker, this program provides questions about paragraph-length material, including sequence, inference, detail, vocabulary in context, and fact/opinion. This combination provides dual input, but the screen could be turned off or obscured.

Developing Critical Reading Skills (Merit Software)

http://www.meritsoftware.com/software/developing_critical_thinking_skills/index.php

When used in conjunction with Merit-Talker, this program can be used both to identify vocabulary in context or to identify main idea and inferences within paragraph length material. This combination provides dual input, but the screen could be turned off or obscured.

Fluid Reasoning and Abstract Reasoning

Definition

Fluid reasoning and abstract reasoning involve problem solving that is not generally based on prior or learned knowledge. Such problem solving might include making inferences, analyzing, synthesizing, and using deductive and inductive reasoning. As broad abilities, fluid and abstract reasoning are used in both verbal and nonverbal situations.

Assessment Measures

Two Woodcock Johnson III tests involve fluid reasoning:

Analysis-Synthesis (test 15)

and

Concept Formation (test 3).

Analysis-Synthesis is a deductive reasoning task where conclusions are reached by following given conditions or guidelines and adapting them to solve problems. Concept Formation is a rule-based measure that utilizes induction and flexibility of thinking to reach conclusions. Both tests present visual stimuli as “keys” or rules.

The WAIS-III does not have any pure measures of fluid and abstract reasoning. However, **Matrix Reasoning (test 7)** items require abstract reasoning such as figuring out the rules that govern patterns and how to complete them.

Functional Implications

Individuals with strengths in these areas frequently excel in mathematics, logic, and science. They also enjoy solving puzzles and complex problems requiring abstract thinking.

An individual with a deficit in either fluid or abstract reasoning may encounter difficulty with abstract math such as algebra, identifying logical sequences, or recognizing how rules should be applied to solve problems. Although generally these limitations apply to abstract problem solving, drawing generalizations from reading assignments and sequencing details in written assignments also may be affected.

Examples

1. A student is enrolled in an algebra class. Because he has difficulty with abstract reasoning, he struggles to understand how numbers can equate with letters or how negative numbers can produce positive numbers.
2. In a science class, the instructor asks students to use the scientific method to solve an experiment. A student with a deficit in fluid reasoning may struggle to understand how or why one step relates to another step without having an outline that demonstrates the scientific method.
3. An employee is asked to analyze a detailed proposal about a new business venture and then outline the general ideas. Because the employee has a deficit in fluid reasoning, he confuses less important details with general ideas.

Instructional Goal

Students will practice the skills of inference, sequence, logic, rule-formation (classification), and organization of complex information leading to improved problem-solving skills. Students will learn to evaluate results and develop new solutions as necessary.

Instructional Considerations

Improvements in abstract reasoning require a combination of teacher support and independent student work on software. Teacher support might take the form of organizing students into teams, providing focus for an activity, or demonstrating organizational strategies.

It is essential that students be made aware of the types of reasoning and organization options appropriate to the problems that they are solving. Examples of problem-solving strategies are working backwards, making a prioritized list, stating the problem as a question, and developing a table or chart.

Students with language-based learning disabilities often discover that visual-spatial software programs like *Factory* and *Safari Search* are easier for them than are more verbally “loaded” programs such as the *Carmen Sandiego* series. Such a realization may help a student understand more clearly the nature of his/her disability.

Software Characteristics

Software should have clear instructions.

Although it may seem redundant to list this elementary software attribute, clarity of instructions is of paramount importance for students with reasoning problems. Additionally, the goal(s) of the program must also be clearly stated.

Software scores should be clear and accessible.

Students will often stray off task with complicated or lengthy programs. Therefore, interim scores or scoring in short segments allows them to correct for errors and have more success in finding solutions.

Software should have a motivating format.

Appropriate feedback will encourage students to continue working on tasks. Age-appropriate and/or contemporary themes are essential to full student participation.

Software should encourage teamwork.

Many students learn best when teaching someone else. Software which permits students to work in teams generates a good learning environment. Team members learn from one another and new solutions emerge from the group which might not have been obvious to an individual working alone.

Success with software requires organization of information.

A primary purpose of this type of software is to teach inference and complex problem solving. Success should require the student to develop and employ a variety of information management strategies. Examples of information management strategies are note taking in the form of a list, table, chart, or solution matrix.

Success with software should require analysis of information.

Students should not be able to “win” by guessing or by trial and error. They should understand exactly how they arrived at a conclusion and why the conclusion is the correct one.

Recommended Software

Mind Benders (Critical Thinking Software)

http://www.criticalthinking.com/series/013/index_c.html

This program works on using language cues to complete a logic puzzle. This lets students work on the foundational processes needed for math word problems without being panicked by math information.

Thinkalogy Level B (Critical Thinking Software)

http://www.criticalthinking.com/series/089/index_c.html

This program provides practice in analogical thinking, both by having the student select words they think are related and choosing the type of analogy that relates them. There are three levels that can be purchased separately, each having more complex vocabulary, but similar types of analogies.

What's My Logic (Critical Thinking Software)

<http://www.criticalthinking.com/index.jsp>

This program requires inductive reasoning to generate and identify the rule that allows the user to move about the program. Items used can be visual (shape, color, and size) or verbal. Level of difficulty can be controlled.

Logical Thinking (Parrot Software)

<http://www.parrotsoftware.com>

This program challenges verbal analysis and interpretation by giving directions including conditions of directionality, basic numeracy, and color. Level of difficulty can be controlled.

Factory Deluxe (Sunburst Software)

<http://store.sunburst.com/ProductInfo.aspx?itemid=176616>

This software challenges visual analysis, synthesis and sequencing through a series of increasingly complex construction tasks. The program teaches separate processes, and then requires the user to appropriately sequence the processes to achieve a finished product. Level of difficulty can be controlled.

Auditory Processing (Cognitive Cluster) and Phonemic Awareness (Clinically Useful Cluster)

Definition

These interrelated areas involve processing of auditory information, with Phonemic Awareness serving as a subset of the broader area of Auditory Processing. Auditory Processing (AP) is the ability to analyze, synthesize, and discriminate auditory stimuli. It includes most of the abilities which are referred to as phonological awareness and phonological processing. It also includes the ability to understand speech that has been distorted or masked in some way. Phonemic Awareness, although not one of the CHC factor clusters, is a clinically useful cluster that may provide helpful diagnostic information. It focuses on the knowledge and skills related to analyzing and synthesizing speech sounds. It requires the individual to isolate different sound elements (phonemes) in a word and then analyze and interpret these sounds.

Assessment Measures

Auditory Processing

On the WJ III, the AP cluster includes two tests: Sound Blending (Test 4) which is a test of phonetic coding that measures skill in synthesizing language sounds (phonemes) and Auditory Attention (Test 14) which measures the ability to understand oral language despite the presence of auditory distortions or masking of speech sounds. The WAIS-III does not specifically measure AP.

Phonemic Awareness

On the WJ III, Phonemic Awareness is measured by two tests: Sound Blending (Test 4), as in the Auditory Processing cluster and Incomplete Words (Test 8) which measures auditory analysis and closure in which a subject is asked to identify a word after hearing the word with one or more phonemes missing. The WAIS-III does not specifically measure Phonemic Awareness.

Functional Implications

A student with strength in this area is likely to be a proficient speller who can easily pronounce unfamiliar words using phonetic analysis.

A student with a deficit in auditory processing or phonemic awareness is likely to encounter difficulty in spelling and note-taking. If the student does take notes, he or she may not be able to interpret what was written because of the lack of sound-symbol correspondence. In addition, the student may have difficulty understanding lectures, particularly if there is any background noise that may interfere with auditory analysis, synthesis, and discrimination. The student with deficits in auditory processing or phonemic awareness may mispronounce syllables in words or confuse similar-sounding words.

Examples

- 1) A student complains that she did poorly on a test because the instructions were not “pacific” [rather than “specific”] enough.
- 2) A nursing student confuses digoxin and digitoxin or gives a patient Xanax instead of Zantac.
- 3) An employee of a catering company is asked to put the “cake” on the table at a social function and is reprimanded because he put the “keg” on the table instead.

Instructional Goal

Students will practice identifying, discriminating, analyzing and segmenting phonemic sounds in isolation and in context.

Instructional Considerations

When phonemic awareness is a weakness in adults, the training process must be intensive over time. Initial and adjunct tasks associated with human voices and one-to-one interaction should be used to facilitate tactile awareness and to encourage functional application. Increases in difficulty and complexity of tasks should be gradual.

Software Characteristics

Sound and graphics should be of high quality

Production of phonemic sounds should replicate human voice as closely as possible. Graphic demonstrations or identifications should also be clear.

Software should provide a variety of activities, be motivating, and yet not be childish

Because this type of practice can quickly become boring, it is important that a variety of tasks and reinforcements be available. Many of the software products for this skill have been developed for children, which can be demeaning for adult students.

Feedback should be educational

Information relevant to the correct answer should be highlighted (perhaps as cues), and there should be feedback to explain ways the inaccurate response did relate to the correct answer, and how it did not.

Software should require mastery before student can advance to a higher level

Some software allows the student to move ahead independently or with too little evidence of task mastery. Confusion and frustration will result if a student advances without complete mastery in this skill.

The software should control for carefully sequenced activities

Phonemic awareness involves skills that must develop in careful order. The instructor should be able to control which aspects of the program would be appropriate for the student at a given time.

Recommended Software

Fast ForWord Literacy/Literacy Advanced/Reading Prep (Scientific Learning)

<http://www.scilearn.com>

This program uses a game format to systematically train auditory processing skills to improve listening and language processing (as a basis for reading and functional listening skills) from the phoneme to short paragraph level. The 50 minute protocol strongly recommends 5 days a week until all skills are mastered (approx. 6-8 weeks for most students).

Literacy lays the basic foundation and Literacy Advanced gives the students new ways to build the same skills as the information they process gets more complex and moves into more reading.

The research basis and individualization of the rate of delivery of the stimuli (via internet connection) to each student to keep them successful, but challenged and motivated, makes this the gold

standard for software programs.

Students have to listen, watch and respond using a keyboard or mouse so other integrated skills are built as well, such as visual processing and visual memory, even though they are not a direct focus.

Locutour Literacy (Learning Fundamentals)

<http://www.locutour.com/products/product.php?id=9>

This set of programs helps set the foundation for reading using excellent visual presentations and video clips. It uses the format that Lindamood-Bell pioneered for auditory discrimination and practice using all modalities.

Lindamood Phoneme Sequencing Program CD-ROM (Gander Publishing)

<https://shop.ganderpublishing.com>

Designed to be used in conjunction with instruction on phonemic awareness, this program provides additional practice with visual/auditory input.

Earobics (Cognitive Concepts)

<http://www.earobics.com>

This program provides auditory memory and auditory processing exercises for student practice.

Brain Fitness Program (Posit Science)

<http://www.positscience.com/programs/buy.php>

Through adaptive training that is continuously customized for an individual user's brain performance, the training program clearly defines goals and shows progress history and achievements.

The training program stores complete training data and presents it in a user-friendly set of feedback/progress screens that occur at the end of each exercise and the end of each training session. In addition (optionally, at the user's request), the training program securely and confidentially uploads all training data where more detailed analyses and feedback can be performed by a phone call to Posit customer service.

The training program presents instructional material in printed form (for reading-focused learning styles), in example form (for auditory learners), and through practice (for experiential learners); in addition the training exercises continuously adapt to the brain performance of each individual learner thus maximizing the learning that an individual performs.

Achievement Deficits

Basic Reading Skills

Assessment Measures

The following tests provide information about basic reading skills:

Letter-Word Identification [WJ III test 1]

This test measures the student's ability to identify letters and words. A low score on this test suggests a lack of reading vocabulary.

Word Attack [WJ III test 13]

This test measures the student's ability to demonstrate the knowledge of phonetic analysis by decoding nonsense words. A low score on this test suggests a lack of phonics and syllabication skills.

Word Reading [WIAT-II]

This test assesses or measures phonological awareness and decoding skills.

Pseudoword Decoding [WIAT-II]

This test measures the student's ability to apply phonetic decoding skills.

WRAT-3 Reading

This test measures the student's ability to read a list of words of increasing difficulty. A low score on this test suggests a lack of reading vocabulary.

Functional Manifestations

A student whose test behavior suggests specific deficits in basic reading skills may have difficulties even in classes where reading ability is not a target skill. Written instructions on tests or worksheets, assignments written on the board, the class syllabus, and word problems in classes such as math, drafting or electronics may present unexpected difficulties for this student. In addition, instructional signs on equipment in classrooms which relate to use or warn of danger may not be comprehended by this student.

In daily life, this student can expect problems with menus, billboards, street signs, warning signs, identifying product names in stores,

reading maps, and finding names in phone books, as well as the more obvious reading situations involving mail, instructions with products, driving tests, and contracts.

Instructional Goal

Students will expand sight reading recognition vocabulary as well as practice word recognition strategies which include phonetic word attack, using context clues, and recognition of word parts (e.g. roots, prefixes, suffixes).

Instructional Considerations

Functional visual scanning skills are essential to the reading process and should be addressed early in instruction. Mastery of a given activity must be achieved without sound output before student progresses to the next level.

To improve academic performance, students can use technology to compensate for weaknesses in sight recognition and word attack skills. Such technology includes computer voice output for auditory text editing, books on tape, and “talking” hand-held spellers/dictionaries.

Any program format which engages students to read at their instructional level will stimulate use of word recognition strategies. The same software may be useful for building word identification skills as well as vocabulary.

Software Characteristics

Software should provide multiple formats for practice.

Having different formats for practice relieves tedium and facilitates generalization.

Authoring component is easy to use.

Having the opportunity to practice personally relevant words enhances/expands the value of the software. Creating personalized reading materials is not practical unless the authoring tool is easy to use.

Software should provide multiple reading levels.

Easily identified reading levels allow an appropriate match between practice material and student’s reading level.

Sound output is desirable.

With sound output students can hear if they have successfully visually decoded a target word. The option to have a word highlighted as it is read is a useful software attribute.

Software should provide TTS capability

Audio reinforcement through text to speech is a useful software attribute.

Recommended Software

Basic reading skills will first be established in the cognitive processing areas.

Fast ForWord Reading Series (Scientific Learning)

<http://www.scilearn.com>

This software uses the same technology as the Literacy and Literacy advanced, and starts with Reading Prep to reinforce basic phonics and help students move from the spoken word to the printed word.

Locutour Literacy (Learning Fundamentals)

<http://www.locutour.com/products/product.php?id=9>

This set of programs helps set the foundation for reading using excellent visual presentations and video clips. It uses the format that Lindamood-Bell pioneered for auditory discrimination and practice using all modalities. It also includes spelling and reading rules practice.

Developing Critical Reading Skills

http://www.meritsoftware.com/software/developing_critical_thinking_skills/

This software provides pre-testing (“Try-out”), focused practice with feedback and explanation (“Work-out”), and post-testing (“Finals”). There are several aspects which are controlled by the instructor, and it will track specific students’ success. Specific benefits for basic reading skills include the identification of vocabulary meaning in context.

Lindamood Seeing Stars CD-ROM Series (Gander Publishing)

<https://shop.ganderpublishing.com>

Designed to be used in conjunction with instruction, this program builds from knowledge of phonemic awareness into basic word identification. Level of difficulty can be controlled.

Reading Comprehension & Fluency

Assessment Measures

The following tests provide information about reading comprehension:

Passage Comprehension [WJ III test 9]

This test measures the student's ability to use context clues to determine the appropriate word in a cloze reading passage. A low score on this test suggests that a student will probably experience difficulty in reading college textbooks.

Reading Vocabulary [WJ III test 17]

This test measures the student's knowledge of word meanings by supplying synonyms and antonyms.

Since college reading materials assume a level of sophistication in word knowledge, a student with a low score on this test will likely experience problems in understanding lecture content and in comprehending course materials.

Reading Fluency [WJ III test 2]

This test measures the student's ability to quickly read simple sentences and decide if they are true or false.

Reading Comprehension [WIAT-II]

This test measures the student's ability to read passages and answer content questions.

Degrees of Reading Power (DRP)

This test measures the student's ability to choose the correct words, in a cloze procedure, to complete the meaning of reading passages with increasing complexity as in the Passage Comprehension test. A low score on this measure suggests that a student will experience difficulty in deriving meaning from written materials.

Weakness in any of the reading comprehension skills may adversely affect a student's school performance.

Nelson-Denny Reading Test

This test measures three areas of academic achievement: vocabulary, reading comprehension, and reading rate.

Functional Manifestations

A student whose test behavior suggests specific deficits in reading comprehension may have difficulty in identifying main ideas, retaining sequences of events, and/or comprehending subtleties (inferences) in written material. The student may attempt classes which involve reading, but may interpret information literally, without drawing conclusions or forming opinions.

In daily life this student is not likely to enjoy recreational reading, and, if interested in current events, is unlikely to obtain this information from newspapers or magazines. In addition, this student may have difficulties in reading situations involving driving tests, mail, product instructions, and contracts.

Instructional Goal

Students will improve passage comprehension by practicing strategies to enhance visualization, identification of the main idea, inferential reasoning, memory for details, and drawing conclusions. Students will use reading skills to obtain information needed to solve problems.

Students will improve vocabulary skills by studying new words and by using contextual clues to deduce meaning of unknown words.

Instructional Considerations

It should be noted that most reading comprehension software tests comprehension rather than teaching strategies. Students need to learn reading comprehension strategies before using the software to practice them.

Games and problem-solving software environments motivate students to work to understand information that they are reading. In this way, application and generalization of reading comprehension skills occurs “painlessly.”

Long-term and short-term memory deficits may interfere with reading comprehension and should be addressed specifically. The instructor should also be aware that success in reading comprehension is dependent upon a student’s understanding the vocabulary in the material being read.

Even when using an appropriate reading level, the use of voice output devices (e.g. hand-held electronic dictionary/speller, or computer voice output, if compatible with software package) will help students compensate for word attack weaknesses.

There are a number of full-featured programs which teach reading

from the pre-literacy level through the high school level. Because such programs are costly, they are most effectively purchased by an institution for campus-wide use.

Note:

Software characteristics and suggested software programs for reading comprehension activities are divided into three basic types:

1. reading comprehension skills only (i.e., main idea, inference, drawing conclusions);
2. vocabulary development; and
3. reading comprehension to achieve software goal (games or simulations).

Software Characteristics: Reading Comprehension

Control of reading level and passage length is desirable.

It is necessary to control passage length in order to ensure student success in decoding material. Text should be presented at or below students' reading levels for this to occur. Material of varied lengths need to be available in order to accommodate time constraints of students (e.g., a 50 minute class period), students' ability to focus and maintain attention on the reading task, and students' level of performance. Short passages must also be available for students unable to comprehend longer ones.

The ability to receive on-line hints or to review the reading passage while answering comprehension questions is desirable.

The ability of many students to mentally organize and retain the material they have read is facilitated by hints or being able to review the passage while they consider the answers to comprehension questions.

Software should employ a variety of response modes.

To make tasks more interesting as well as challenging, a variety of response modes is desirable (e.g. multiple choice responses for comprehension questions, underlining for selecting the main idea in text). Because students get bored with repetitive tasks, being forced to respond in different modes promotes different ways of processing information and formulating concepts.

Software should allow students to demonstrate comprehension without regard for spelling accuracy or an exact sequence of words.

Programs which require exact spelling and phrasing may measure areas of weakness rather than focusing on the task of reading comprehension. The option to review vocabulary prior to reading passages is desirable.

On-line dictionaries assist with acquisition of vocabulary knowledge needed to understand a reading passage. Using them provides students with practice in using reference materials as well as assisting with comprehension.

Software should include a variety of comprehension tasks (e.g. finding the main idea, reading for facts, making inferences, and drawing conclusions).

Practice in different types of reading tasks is necessary in order to help students build skills in specific areas and to help students understand the spectrum of activities which encompass reading comprehension.

Text on the screen should be easy to perceive.

An uncluttered screen format and good text resolution is necessary to facilitate reading speed, reduce eye strain, and reduce negative effects from visual perceptual interference.

Software Characteristics: Vocabulary Development

Screen should be uncluttered.

An uncluttered screen allows relevant information to stand out. Students with visual processing difficulties and poor scanning skills may have difficulty separating the target vocabulary word from other on-screen information if the screen is cluttered.

Authoring component should be easy to use.

An editing or authoring option in vocabulary instruction is very practical for the study of vocabulary because it allows individualization of word lists. Students may input glossary items from their text books in order to prepare for reading or taking exams. Students who input their own word lists will have the additional benefit of manipulating their word list in a way which will enhance their understanding of the words.

Content should be effectively organized.

Objectives for the development of vocabulary should be functional and clearly stated. Whether by grade-level, part of speech, “survival” vocabulary or other system, its organization should be in agreement with the instructional needs of these students.

Sound output for each vocabulary word is desirable.

With sound output for vocabulary words, students receive an additional stimulus for learning. Additionally, having an auditory model for a word may facilitate correct pronunciation of the word. (If sound is not an option provided by a program, the use of electronic dictionaries with sound output would prove to be helpful.)

Software Characteristics: Games or simulations which require reading comprehension

Software should provide a motivating environment.

It is easier for students to apply and generalize their reading comprehension strategies when they are motivated to read on. Students need to understand information from passages in order to solve problems and reach the goal of the program.

Program should provide the option to stop and save a game in progress.

Due to students’ time constraints, attention spans and general fatigue factors, it is often necessary to stop a game before the goal has been attained. Students often feel more productive when they can save the activity and resume at a later time.

Recommended Software

Fast For WordReading Series (1-5) (Scientific Learning)

<http://www.scilearn.com>

These programs guide students systematically through the elements of reading, reading comprehension and fluency while continuing to build the necessary working memory and long term retrieval necessary to process what they read and use strategies that are effective.

Developing Critical Reading Skills

http://www.meritsoftware.com/software/developing_critical_thinking_skills/

With components that provide pre-testing, focused practice with feedback and explanation, followed by post-testing exercises, this software also provides practice with identifying main ideas and the use of inference.

Vocabulary Fitness (Merit Software)

http://www.meritsoftware.com/software/vocabulary_fitness/index.php

With components that provide pre-testing, focused practice with feedback and explanation, followed by post-testing exercises, this software provides exercises to help students differentiate commonly confused words by using them in the correct context.

Grammar Shape-Up

http://www.meritsoftware.com/software/grammar_shape_up/index.php

Following the common format of the Merit Software products, this software uses components that provide pre-testing, focused practice with feedback and explanation, followed by post-testing exercises. Providing exercises that deal with specific topics in the categories of nouns, adjectives, pronouns, verbs, adverbs, and prepositions and conjunctions, this software has students identify which word is a specific part of speech, select words with similar meanings, and determine correct vocabulary word by providing different contexts.

Reading Shape-Up (Merit Software)

http://www.meritsoftware.com/software/reading_shape_up/download.php

This program works on reading comprehension by providing practice answering questions about paragraph-length material, including sequence, inference, detail, vocabulary in context, and fact/opinion. When combined with Merit-Talker, this program could provide dual input when needed.

Ultimate Speed Reader (Smart Kids Software)

<http://www.smartkidssoftware.com/nddav41.htm>

This program facilitates reading speed in order to develop reading fluency. Assessment of reading speed and development of a program of practice is provided, but not required. Information is multiple paragraphs in length. Speed of presentation and number of words grouped/highlighted can be controlled.

Basic Mathematics Skills

Assessment Measures

The following tests provide information about basic mathematics skills:

[21 Calculation [WJ III test 5]

This test measures the student's ability to perform mathematical calculations from basic operations through calculus. If the test protocol is available, an analysis of the student's errors can provide insight into whether the student understands the concepts or is making only calculation errors. Prescriptive software must take into account the types of problems with which the student is experiencing difficulty.

Quantitative Concepts [WJ III test 18]

This test measures the student's knowledge of basic mathematical concepts and vocabulary. A low score on this test may impact the student's performance in classes which have a mathematical base, e.g., chemistry, anatomy and physiology, accounting, etc.

Math Fluency [WJ III test 6]

Measures the ability to solve simple addition, subtraction, and multiplication facts quickly.

Numerical Operations [WIAT-II]

This test measures the student's ability to solve written calculation problems and simple equations involving all basic operations: addition, subtraction, multiplication, and division.

WRAT-3 Arithmetic

This test measures the student's ability to perform mathematical calculations under timed conditions. A low score on this test needs to be evaluated to determine whether the score is due to time constraints rather than lack of math knowledge.

Functional Manifestations

A student whose test results suggest specific deficits in basic mathematical skills may also have difficulties in classes where math is not a target skill. Computing changes in measurements within hard or soft science lab assignments, understanding statistics within research articles, and handling the computing requirements within almost any mechanical, drafting or electronic courses may present

unexpected difficulties for this student. In daily life this student may expect problems with making change, determining tips, managing financial accounts, estimating budgets, calculating taxes, and any measurement calculations involved in constructing, cooking or sewing.

Instructional Goal

Students will demonstrate knowledge of mathematical concepts, vocabulary, and calculations. Secondly, students will maximize processing speed of calculations without sacrificing accuracy.

Instructional Considerations

Work on basic mathematical skills can be tedious, so a variety of approaches is helpful. Speed of solving basic processes such as addition, subtraction, multiplication and division should be encouraged to promote an automatic response. If that is not feasible, then compensatory techniques such as rapid use of a calculator should be considered. Be aware of differences in instructional approaches between the classroom and the software.

Software Characteristics

Software should allow control of basic mathematical processes.

Students should be able to control numeric range (e.g. single digit, double digit, etc.) in order to provide practice in appropriate areas.

Software should provide instruction to introduce concepts prior to practicing skills.

This gives students relevant information needed to complete exercises. Avoid math software without a tutorial component.

Software should provide opportunity for drill or game format with frequent feedback.

Immediate feedback is necessary in order to correct any errors before a student advances in a program. Drill allows development of automatic responses with basic mathematical functions. Games provide a motivating format for this.

Students should be able to return to missed items.

This will clarify errors and allow students to demonstrate that they now understand the correct procedure.

A customizing component is desirable.

Students or instructors can select a specific number of problems and levels of practice in order to create individualized lessons.

Software should have an optional component for monitoring speed of processing.

“Beating-the-clock” is especially motivating in a game format. If students are able to focus and maintain attention, speed, and accuracy, their automatic responses to basic math calculations may improve.

Suggested Software

ModuMath

<http://www.modumath.org/home/index.htm>

This program is well sequenced and multi-sensory and provides several modules for laying a math foundation or for specific practice in certain areas. It goes slowly without talking down to the students.

Timez Attack

<http://www.bigbrainz.com/index.php>

This program provides time-pressured practice of basic multiplication within a stimulating game environment. Level of difficulty can be adjusted, and mastery is required before moving on.

Math Playground (this is a free website)

<http://www.mathplayground.com/index.html>

This program facilitates basic mathematics skills by providing math manipulatives for basic topics. There are also flashcards which can be timed for addition, subtraction, mixed +/-, and multiplication. Multiplication can be adjusted for specific areas of difficulty.

Mathematics Reasoning

Assessment Measures

The following test provides information about mathematics reasoning:

Applied Problems [WJ III test 10]

This test measures the student's ability to solve word problems in mathematics. A low score on this test may indicate a lack of mathematical vocabulary or a lack of understanding of math concepts. The student will struggle with problem solving activities in some vocational programs such as nursing or drafting and in classes such as algebra or chemistry.

Quantitative Concepts [WJ III test 18]

This test measures knowledge of mathematical concepts, symbols, and vocabulary.

Math Reasoning [WIAT-II]

This assesses the ability to reason mathematically, including identification of geometric shapes, solving single and multi-step word problems, interpreting graphs, identifying mathematical patterns, and solving problems related to statistics and probability.

Mathematics Diagnostic Testing Project [MDTP]

This test measures a student's performance in algebra readiness, elementary algebra, and intermediate algebra.

Functional Manifestations: Mathematical Reasoning

A student whose test results suggest specific deficits in mathematical reasoning may be able to handle the calculations involved in course work, but may not be able to determine the calculation process needed or to set up the calculation. The struggle in algebra and statistics classes may be obvious, but other courses such as biology, chemistry, physics, anatomy and physiology, and courses of study such as business, nursing, computer sciences, drafting and electronics may also present difficulties.

In daily life, this student may generally avoid situations requiring mathematical reasoning. The student may need assistance in budgeting, managing financial accounts, calculating taxes, determining efficient travel routes, verifying hours adjustments

and taxes in their employment, and in modifying tasks involving construction, cooking, or sewing.

Instructional Goal

Students will demonstrate the reasoning and sequencing involved in word problems and in more complex mathematical processes.

Instructional Considerations

It is extremely important that students be taught necessary mathematics vocabulary (e.g. difference, sequential, yields).

Many algebra texts now include the possibility of acquiring tutorial software correlated with the text. Software not related to a text should be evaluated in terms of its terminology, content and solution processes as related to the students' courses. There are non-computational skills underlying many mathematical processes (e.g. short-term and long term memory, sequencing). These must be addressed specifically.

Software Characteristics

Word problems should present reasoning processes in a sequential fashion and include a variety of problems.

Students benefit from following clear models. Extended practice develops automatic responses to structuring and solving problems.

Feedback should be frequent and educational.

If response is repeatedly incorrect, the process for achieving an accurate solution should be demonstrated.

Software should provide extended practice with a wide variety of problems and/or the option of repeating problems with different numbers.

Students benefit from repetition in learning to structure and solve problems. This enables them to develop a format for approaching mathematical problems.

It is desirable that software cover a wide variety of mathematical processes.

A comprehensive program allows students to progress to higher levels without having to learn how to use a new program.

Recommended Software

Modumath (WTCSF)

<http://www.modumath.org/home/index.htm>

This program is well sequenced and multi-sensory and provides several modules for laying a math foundation or for specific practice in certain areas. It goes slowly without talking down to the students.

There are lots of practice exercises for calculation as well as excellent visual representations for math word problems.

Word Problem Shape-Up (Merit Software)

http://www.meritsoftware.com/software/word_problem_shape_up/index.php

With components that provide pre-testing, focused practice with feedback and explanation, followed by post-testing exercises, this software develops mathematical reasoning through the use of different operation vocabulary within each unit: add/subtract only, multiply/divide only, add/subtract/multiply/divide, operations using fractions, and operations using decimals and percents.

Pre-Algebra Shape-Up (Merit Software)

http://www.meritsoftware.com/software/pre_algebra_shape_up/index.php

Using components that provide pre-testing, focused practice with feedback and explanation followed by post-testing exercises, this software also provides “Warm-up” practice sections for specific aspects of each topic.

Mathematical Reasoning is addressed with different subjects within each unit: Understanding Percents, Ratios-Fractions-Percents, Words to Numbers, Introduction to Equations with add/subtract, Introduction to Equations with multiply/divide, Converting Metrics, Introduction to Graphs, Reading Line/Column Graphs, and Reading Pie Charts.

Basic Writing Skills

Assessment Measures

The following tests provide information about basic writing skills:

Spelling [WJ III test 7; WIAT II, WRAT-3]

These tests measure a student's ability to spell words correctly. Problems in this area will be reflected in the student's work.

Editing [WJR test 16]

This test measures the student's ability to recognize and correct errors in spelling, punctuation and capitalization, and usage. A low score on this test suggests that a student will have problems in proofreading written work to find and correct errors.

Note:

For basic writing skills, the Functional Manifestations section and the Software Characteristics sections have been assigned to two primary aspects of writing in order to cover each area with appropriate depth. These two areas are

1. Spelling, and
2. Writing Mechanics and Proofing.

Functional Manifestations: Spelling

A student whose test results suggest specific deficits in spelling may have difficulties even in classes where writing is not a target skill. Taking notes during lectures, writing down assignments accurately, and writing answers to in-class tests and quizzes within a specified time may present unexpected problems. Students with severe deficits may even have difficulty finding correct spellings in dictionaries or understanding their own writing after some time has passed.

In daily life this student may not write formal or informal correspondence (letters, memos or messages), and may have difficulty taking phone messages, filling out forms, writing checks, or locating any information which is alphabetized (e.g. names in the phone book, books at libraries, information in encyclopedias).

Instructional Goal

Students will learn and review new spelling words, spelling patterns, and phonics skills.

Instructional Considerations

Before students work on spelling software, it is important that they understand what spelling strategies work best for their learning styles. They also must know what spelling skills they are expected to use or develop when using spelling software.

If students will be using handwriting to take spelling tests, it is important that they use handwriting to practice spelling as well as practicing at the computer keyboard.

Correct spelling is primarily the result of applying phonics knowledge (auditory analysis, auditory memory, and sound- symbol association) as well as visual memory; and visual- motor memory. Ideally, the software should provide spelling lists for each critical element in the development of phonics skills.

If students use compensatory technology, they can concentrate on critical aspects of writing (content, organization, cohesion, word choice) instead of being concerned with spelling accuracy. Compensatory technology includes on-line spelling checkers, dictionaries, thesauruses, hand-held spelling checkers, abbreviation expansion software, macros, and voice input.

Software Characteristics: Spelling

Software should provide lists of words exemplifying a given rule and provide a logical hierarchy of rules.

Activities which focus on words exemplifying a single rule encourage generalization of the rule (e.g., adding suffixes to words ending in silent “e”) and are more useful than drill designed for memorization of isolated spellings. Rule complexity level should reflect the reading/ spelling level of words in word list (for example, -tion vs. -sion) would not be an appropriate rule for a second grade level list of spelling words.

Authoring component is easy to use.

The opportunity to practice personally relevant spelling lists enhances/expands the value of the software for students. Creating personalized lessons is not practical unless the authoring tool is easy to use.

Students should have multiple formats for practicing skills.

Having different formats (e.g. flash card, unscramble, crossword, word search, spelling bee, spell in context) for practice relieves tedium and facilitates generalization.

Software should include a range of levels and topics covered and/or provide data disks for different levels and topics.

This allows students with differing spelling levels to use the software. Students can progress through levels of greater spelling mastery without having to learn a new program.

Sound output is desirable.

Sound output confirms target words for students who are not sure they have read the word correctly. The psychological process of learning new spellings usually begins by hearing a word (either aloud or subvocally).

The software program should permit students to adjust the amount of time allowed for studying new words.

Students require different amounts of processing time in different contexts. Processing time decreases with familiarity. It is difficult for students to learn new information when under pressure.

Suggested Software: Spelling

Completion from Partial Information (Parrot software)

<http://www.parrotsoftware.com>

This program challenges spelling skills by providing several partially written words included within a specified category. Missing letters can be vowels only or random letters.

Vocabulary Fitness

http://www.meritsoftware.com/software/vocabulary_fitness/index.php

With components that provide pre-testing, focused practice with feedback and explanation, followed by post-testing exercises, this software helps develop spelling skills by requiring the student to identify possible errors within a sentence.

WordQ

<http://www.wordq.com/wordq2english.html>

This software works within the word processing software interface, thereby not requiring the student to switch between software interfaces. By assisting students with spelling options this software also learns the words most commonly used by students, building a usage history that allows for word-prediction functionality as well.

Functional Manifestations: Writing Mechanics and Editing

A student whose test results suggest specific deficits in writing mechanics may avoid classes where writing is a target skill, but may still encounter difficulties in writing essay answers on tests, taking effective notes in lectures, writing directions to complex assignments or messages to instructors. In daily life, this student may not produce formal or informal correspondence (e.g. letters, memos or messages), or instructions as given by doctors or other professionals.

Instructional Goal

Students will demonstrate knowledge of the rules of capitalization, punctuation and grammar and practice strategies for monitoring and correcting errors in written work.

Instructional Considerations

Students must see the relationship between their written work and rules they are learning.

Students can improve the writing mechanics in their written assignments with the help of on-line editing aids such as grammar manuals and grammar checkers working in coordination with their word processing program.

Students should be encouraged to use more than one program to improve their writing mechanics. No one program provides enough practice material in enough different contexts to ensure mastery of a concept.

Software Characteristics: Writing Mechanics and Editing

Proofing programs need to provide control over aspects of writing mechanics covered in a given activity.

Students should be dealing only with material for which they have prepared themselves.

Instruction should be clearly presented with ample examples and no jargon.

Clear presentation facilitates comprehension. Examples facilitate comprehension and generalization.

Feedback should be frequent and educational.

Students should have access to a printed record of progress including number attempted, number missed, percent correct, and list of errors. (They can use this information to assess performance and set new goals). The students should also be provided with immediate feedback as well as hints and opportunities to retake missed items as this practice creates a model for self-cueing. When students successfully re-take missed items, they can feel successful as they are learning a concept.

Authoring component is easy to use.

Creating personally relevant material with which to practice a skill is always beneficial to the student. An instructor can individualize instruction by using an authoring component when one is provided. However, for both student and instructor, creating personalized lessons is not practical unless the editing tool is easy to use.

Providing numerous practice items is desirable.

Students need a great deal of practice with grammatical concepts before achieving fluidity with the concepts.

Recommended Software: Writing Mechanics and Editing

Vocabulary Fitness

http://www.meritsoftware.com/software/vocabulary_fitness/index.php

Using modules that provide pre-testing, focused practice with feedback and explanation followed by post-testing exercises, this software allows the student to develop skills in identifying possible errors within a sentence.

Focus on Grammar

<http://www.exceller.com/focus-on-grammar.html>

This program provides grammar practice in several areas.

Grammar Fitness

http://www.meritsoftware.com/software/grammar_fitness/index.php

With pre-testing, focused practice (with feedback and explanation) followed by post-testing exercises, this software has students identify possible errors involving possessives, confused words, irregular plurals, fragments, run-ons, modifiers, agreement, etc.

Written Expression

The following tests provide information about written expression:

Writing Samples [WJ III test 11]

This test measures the student's ability to express ideas by producing single words, simple sentences and complex sentences. A low score on this test will be reflected in the quality of written course requirements such as tests, in-class assignments, and out-of-class papers.

Writing Fluency [WJ III test 8]

This test measures the student's ability to write clear sentences under timed conditions. A low score on this test suggests that a student may not have sufficient time to complete assignments.

Written Expression [WIAT-II]

This test measures the student's ability to combine and generate sentences and to produce a persuasive essay.

Functional Manifestations

A student whose test results suggest specific deficits in written expression may be able to handle simple writing tasks, but may encounter difficulty when there is limited time to write, or when more complex writing is required. Organization of ideas, integration of concepts, or expressing interpretation of symbolism may present difficulties for this student, especially in timed situations such as essay tests.

In daily life this student may not enjoy writing, and therefore avoid complex writing tasks such as formal correspondence to businesses, politicians, or the media. This student may avoid employment in a setting where complex writing skills are a requirement (e.g., correspondence, memos, briefs, reports, summaries).

Instructional Goal

To enhance the student's ability to facilitate and monitor expression of ideas in sentences and paragraphs. To develop the ability to monitor written language production.

Instructional Considerations

In order to practice writing skills, the student first needs to learn or know the basic components of writing (i.e. pre-writing, writing, and editing). Instruction in these areas must be clearly presented in order

for the student to practice them.

Although students are often reluctant to spend time on generating and prioritizing their ideas, programs which help them brainstorm and visually organize their writing are helpful in reducing the time they spend in formulating their first drafts.

On-line editing programs (e.g. spell-checkers, grammar-checkers) can be very effective in assisting students with written expression. However, as they are not considered computer-assisted instruction, their use will not be addressed here.

Software Characteristics

Software should have components to facilitate brainstorming and organization of ideas.

Students often need instruction in organizing and planning written language. Using pre-writing software activities helps to establish a solid framework for written composition.

Software should have components to check for grammatical and spelling errors.

When using a word processor or a program designed to teach writing skills, interactive spelling and grammar checkers can be effective in helping students learn to find errors in their written work. Optional tutorial information about why the identified aspect could be in error and suggestions for possible revisions allow students to learn from their mistakes. Such features enable students to identify errors they might not otherwise have noticed; students are then actively involved in the proofreading process.

The program should provide feedback to students about the content of their written work.

Students can become aware of common errors and problems in writing (e.g. homophones, clichés etc.) when analyzing feedback.

Software should provide a word processing component with editing features.

While students are learning to produce and edit written language, it is better for them to produce a final document without having to transfer the file into a word processing program before proceeding.

Program should provide organizational skills with feedback.

Students who cannot generate ideas or independently organize them without concrete examples may benefit from putting information into

outlines which can become frameworks for essays.

Software should provide supplementary exercises.

Supplementary exercises (i.e. paper pencil activities) designed to give practice in all aspects of producing written work gives students writing practice in a controlled environment. Generalization of skills is more likely when multi-modal practice occurs.

Recommended Software

Inspiration (Included Templates)

<http://www.inspiration.com/store/main/index.cfm?fuseaction=insp.single>

The templates included in Inspiration provide an excellent structure for several types of writing assignments across various disciplines (Language Arts, Planning, Science, Social Studies, Thinking Skills). This program is a key tool in any college writing lab.

Paragraph Punch

http://www.meritsoftware.com/software/paragraph_punch_test/index.php

This software focuses on specific topics in each unit: Reasons, Details, Example, Cause and Effect, and Sequence.

Students answer questions and follow guided steps to help construct a paragraph. Exercises include brainstorming, listing ideas, writing sentences from the list, combining sentences to make a paragraph, and editing to improve the paragraph.

Essay Punch

http://www.meritsoftware.com/software/Copy%20of%20essay_punch_online/index2.php

This software presents the student with questions to answer, including examples of correct answers to help ease the student into process.

Working on specific topics such as Persuasion, Information, and Description, written expression is developed through answering questions and following guided steps that help construct a paragraph. These exercises include activities in brainstorming, organizing ideas, writing paragraphs, and combining paragraphs for essays.

Phoneme/Grapheme Knowledge (WJ III Achievement Cluster)

Definition

This cluster represents a subset of Phonemic Awareness, which involves analyzing speech sounds and associating them to read or to spell words. Phoneme/Grapheme Knowledge evaluates the ability to analyze sounds as well as proficiency recognizing phonic (sound pronunciation) and orthographic (sound/spelling) patterns. Thus, both decoding (reading words) and encoding (spelling words) are involved.

Assessment Measures

Word Attack (Test 13) presents a series of phonetically correct “nonsense” words for a subject to blend (put together the sounds into one word) and correctly pronounce. This involves decoding—seeing words to pronouncing them.

Nonsense words are presented orally on **Spelling of Sounds (Test 20)** and subjects are asked to spell the words as they sound. The purpose of the test is to evaluate phonological coding skills as well as recognition of the most common orthographic or visual letter sequences/combinations found in most English words. This type of task is called encoding—hearing sounds to spelling them.

Functional Implications

A person with a good foundation in phonetic and orthographic structure generally reads and spells fluently. At the same time, because neither task requires understanding of word meaning, per se, some people who have adequate phoneme/grapheme knowledge may not have college-level reading skills because they have not acquired appropriate reading strategies. Nonetheless, both decoding and encoding represent important first steps in reading and spelling. It also is important to note the key role auditory processing plays in acquiring phoneme/grapheme knowledge. For example, if a person has difficulty with auditory processing itself, then grasping the difference among similar sounds, he/she may, therefore, have difficulty learning orthographic “rules.”

Examples

A student who struggles with decoding is likely to find reading tedious because he/she does not easily pronounce written words. This weakness may lead to skipping words that are not easily read

or to becoming easily frustrated. Some students also may mistake similar words for one another, which then causes misinterpretation of passages.

Weak encoding results in misspelling, which frequently affects written assignments and note taking. When this happens, students may avoid written assignments or may not produce high quality work because word choice is limited to words that are easily spelled.

Instructional Goal

Students will apply skills in discriminating, analyzing and segmenting phonemic sounds together with whole word reading skills to improve decoding of words.

Students will apply skills in identifying and discriminating phonemic sounds together with skills and knowledge of rules to improve spelling.

Instructional Considerations

Skills in decoding need to develop at the single word level prior to integrating into reading at the phrase or sentence level. This process often requires word to picture matching types of tasks. Selection of appropriate vocabulary is important. As the skills develop to use at the phrase or sentence level, use of vocabulary within context and later out of context will be useful.

Spelling ability can improve significantly more at the single word level as opposed to within phrase or sentence level. Most students will need to develop careful proofreading skills to monitor for spelling after writing rather than interrupt their thoughts to monitor for spelling simultaneously.

Students may benefit from using technology to compensate for weaknesses in decoding and/or spelling of words in longer written material. Technology for decoding includes screen readers, e-text, audio production of text (e.g. tape, MP3), and other electronic reading devices. Relevant current technology for spelling includes an array of spell-checkers, word prediction software, text readers, and hand-held spellers/dictionaries.

Software Characteristics

Sound and graphics should be of high quality

Production of phonemic sounds should replicate human voice as closely as possible. Graphic demonstrations or identifications should also be clear.

Software should provide a variety of activities, be motivating, and yet not be childish

Because this type of practice can quickly become boring, it is important that a variety of tasks and reinforcements be available. Many of the software products for this skill have been developed for children, which can be demeaning for adult students.

Feedback should be educational

Information relevant to the correct answer should be highlighted (perhaps as cues), and there should be feedback to explain ways the inaccurate response did relate to the correct answer, and how it did not.

Software should require mastery before student can advance to a higher level

Some software allows the student to move ahead independently or with too little evidence of task mastery. Confusion and frustration will result if a student advances without complete mastery in this skill.

The software should control for carefully sequenced activities

Phonemic awareness involves skills that must develop in careful order. The instructor should be able to control which aspects of the program would be appropriate for the student at a given time.

Recommended Software

Fast For Word Literacy/Literacy Advanced (Scientific Learning)

<http://www.scilearn.com>

This program uses a game format to systematically train auditory processing skills to improve listening and language processing (as a basis for reading and functional listening skills) from the phoneme to short paragraph level.

The 50 minute protocol strongly recommends 5 days a week until all skills are mastered (approx. 6-8 weeks for most students). Literacy lays the basic foundation and Literacy Advanced gives the students new ways to build the same skills as the information they process gets more complex and moves into more reading.

The research basis and individualization of the rate of delivery of the stimuli (via internet connection) to each student to keep them successful, but challenged and motivated, makes this the gold

standard for software programs.

Students have to listen, watch and respond using a keyboard or mouse so other integrated skills are built as well, such as visual processing and visual memory, even though they are not a direct focus.

Locutour Literacy

<http://www.locutour.com/products/product.php?id=9>

This set of programs helps set the foundation for reading using excellent visual presentations and video clips. It uses the format that Lindamood-Bell pioneered for auditory discrimination and practice using all modalities. It also includes spelling and reading rules practice.

Earobics (Cognitive Concepts)

<http://www.earobics.com>

This program provides auditory memory and auditory processing exercises for student practice.

Lindamood Phoneme Sequencing Program CD-ROM (Gander Publishing)

<https://shop.ganderpublishing.com>

Designed to be used in conjunction with instruction on phonemic awareness, this program provides additional practice with visual/auditory input.

Oral Language (WJ III)

Oral Language consists of standard and extended clusters that evaluate several areas such as receptive/expressive vocabulary, listening ability, comprehension, and memory. While the standard cluster is purely an achievement measure, the extended cluster may be used as an aptitude measure to compare performance in other achievement clusters to predict an oral language/achievement discrepancy.

Assessment Measures

Standard Battery:

Story Recall (Test 3) evaluates listening skills, comprehension, and memory for details. Several short stories—with increasing length—are presented on tape/CD, and then the subject is asked to recall and recite story details.

Understanding Directions (Test 4) requires listening to directions and then following the directions by pointing, in correct sequence, to items in pictures. The directions become more complex, requiring both greater listening attention and decision making.

Extended Battery (includes Test 3 and 4, and the following tests):

Picture Vocabulary (Test 14) is largely an expressive language task that examines oral language development and word knowledge by presenting pictures and asking the subject to give one word definitions.

Oral Comprehension (Test 15) measures listening, reasoning, understanding of what is heard, and word knowledge. Subjects listen to a series of increasingly complex sentences and then supply the final missing word. (Comparison of this test with **Passage Comprehension (Test 9)** can be useful in determining if auditory attention is an issue to be further considered.)

Functional Implications

People with good oral language skills are proficient listeners who have good stores of word knowledge, as well as ability to utilize semantic and syntactic clues. Good short-term memory and auditory processing also are involved in oral language. In contrast, those who have poor oral language frequently struggle with oral directions, especially if they are complex or lengthy, and they also may need visual input to understand and master concepts.

When a person displays difficulty in other achievement areas such as reading, math, or written language, comparison with oral language skills may provide good input for instructional strategies as well as a basis for an aptitude-achievement discrepancy.

Examples

- 1). A student with a deficit in oral language, especially listening comprehension, is enrolled in a history where the instructor routinely lectures without providing handouts or writing on the board. The student may struggle with note taking and comprehension of lectures content.
- 2). In an anatomy class a student can describe the position of items in the body as well as explain their uses, but he/she struggles to “name” the item with a one word definition because of difficulty with single word-symbol association.

Instructional Goal

Students will practice listening to information of increasing difficulty and complexity and demonstrate understanding and retention of the material.

Students will demonstrate understanding and use of an increasing array of vocabulary.

Instructional Considerations

Although software requiring responses to auditory-presented, task-specific directions (up to five steps) is available, there is no commercially available software that monitors comprehension of lengthy material directly. There are many emerging products and websites that require for listening to lengthier information designed for the English as a Second Language (ESL) learner. These allow for students to listen to more lengthy information through dialogues and lectures, some of which are academic in nature, and respond to multiple choice or short-answer questions.

There are reading comprehension products that allow a spoken component to run simultaneously with the reading. For these to be purely auditory in nature, the monitor would need to be obscured, which would impact navigation of the program.

As content increases in length, students will need to utilize strategies to assist short and long-term retrieval in order to organize and retain information.

It should be noted that tests used to measure these skills require a verbal/oral response, while most computer software requires a written or motor response.

Software Characteristics (Verbal)

Speech production should be of high quality

The quality of the speech, as well as inflection and prosody, should approximate human speaking as closely as possible.

Control of passage length and complexity is desirable

Material of varied length and complexity need to be available in order to accommodate and yet challenge students' skills and ability to maintain focus on the information.

Software content should reflect differing levels and types of complexity

Material can increase in difficulty in many ways: in length, in grammatical complexity, and in the abstractness of its ideas. The software should effectively organize difficulty levels acknowledging these parameters.

Content should require association and/or analysis of ideas

Students should not be able to easily guess using common sense or trial and error. Responses should reflect accurate understanding of material presented. Tasks should require students to determine main ideas, make inferences, and/or draw conclusions.

Software Characteristics (Vocabulary)

Objectives and content should be clearly organized

Whether by grade-level or topic, organization should be in agreement with the instructional objectives for students.

Response processes should reflect knowledge of word meanings or relationships

Both multiple choice and single word entry responses should be available, but unless instructional objectives stress accurate spelling, the program should provide some assistance and/or accept a range of spelling accuracy in responses. When responses are inaccurate, the correct answer should be displayed.

Authoring component is easy to use

Entry of material relevant to students' current needs is the most functional use of these programs.

Spoken output is desirable but needs to be of high quality

It is highly useful for students to hear as well as see new vocabulary in order to more easily generalize its use into spoken language; however, the quality of speech and inflection should closely approximate human speaking.

Recommended Software

Fast For Word Literacy/Literacy Advanced (Scientific Learning)

<http://www.scilearn.com>

This program uses a game format to systematically train auditory processing skills to improve listening and language processing (as a basis for reading and functional listening skills) from the phoneme to short paragraph level.

The 50 minute protocol strongly recommends 5 days a week until all skills are mastered (approx. 6-8 weeks for most students). Literacy lays the basic foundation and Literacy Advanced gives the students new ways to build the same skills as the information they process gets more complex and moves into more reading.

The research basis and individualization of the rate of delivery of the stimuli (via internet connection) to each student to keep them successful, but challenged and motivated, makes this the gold standard for software programs.

Students have to listen, watch and respond using a keyboard or mouse so other integrated skills are built as well, such as visual processing and visual memory, even though they are not a direct focus.

This helps receptive oral language by training listening and direction following skills. It is important to note, however, that students need to work with live humans to practice expressive oral language skills.

Listening Skills & Conditional Statements (Parrot Software)

<http://www.parrotsoftware.com>

These programs all give verbal instructions to be completed, up to 3 steps in Memory for Directions, up to 5 steps in Listening skills, and 1 step that increases in linguistic complexity in Conditional Statements. Memory for Directions can be verbal or written, while Conditional Statements can be verbal, written, or both.

Using Propositional Speech (Parrot Software)

<http://www.parrotsoftware.com>

This program facilitates word finding and production by requiring the user to say the name of an item and a specific preposition in order for the program to move the item.

Reading Shape-Up (Merit Software)

http://www.meritsoftware.com/software/reading_shape_up/download.php

When used in conjunction with Merit-Talker, this program provides questions about paragraph-length material, including sequence, inference, detail, vocabulary in context, and fact/opinion. This provides dual input, but the screen could be turned off or obscured.

Developing Critical Reading Skills (Merit Software)

http://www.meritsoftware.com/software/developing_critical_thinking_skills/

When used in conjunction with Merit-Talker, this program can be used both to identify vocabulary in context or to identify main idea and to inference within paragraph length material. This provides dual input, but the screen could be turned off or obscured.

References

California Community Colleges Chancellor's Office. *Computer Assisted Record-keeping Scoring*. Sacramento. 1993 - 2007.

Wilkinson, G.S. (2005) *Wide Range Achievement Test 3 (WRAT 3)*. Lutz, FL: Psychological Assessment Resources, Inc.

Koslin, B.L., Koslin, S., Zeno, S.M, & Ivens, S.H. (1989) *Degrees of Reading Power*. Brewster, NY: Touchstone: Applied Science Associates.

Squires, David & Preece, Jenny (1999) *Interacting with Computers*. Elsevier Science B.V.

The Psychological Corporation (2002) *Wechsler Adult Intelligence Scale (WAIS) 2002*, San Antonio, TX: The Psychological Corporation

The Psychological Corporation (2001) *Wechsler Individual Achievement Test (WIAT II) 2001*, San Antonio, TX: The Psychological Corporation

Woodcock, R.W., McGrew, K.S. & Mather, N. (2005) *Woodcock-Johnson III*. Chicago: Riverside Publishing Co.

Software References

Academic Challenge Cup

Critical Thinking Books & Software © 1997

The Critical Thinking Co.
P.O. Box 1610
Seaside, CA 93955-1610

Mac/Windows

Single License: \$59.99
10 user license: \$236.99
Unlimited Site License: \$ 825.99

<http://www.criticalthinking.com/getProductDetails.do?id=04003&code=c>

Ancient Wisdom

Cambrix Publishing © 1995

Cambrix Publishing, Inc
9304 Deering Ave
Chatsworth, CA 91311

Mac/Windows

Currently out of production

Brain Fitness Program

Posit Science Corporation, © 2006-2007

Posit Science Corporation
20100 S. Vermont Ave.
Torrance, CA 90502

Windows

Single license: \$395.00
Two user license (1 PC): \$495.00
Two user license (1 PC + Coaching Kit): \$595.00

<http://www.positscience.com/programs/buy.php>

Building Perspective Deluxe

Sunburst Software © 1998

Sunburst Technology

1550 Executive Drive
Elgin, IL 60123

Mac/Windows

Single license: \$59.95
10 user license: \$159.95
Network license: \$699.95
Unlimited Site: \$699.95

<http://store.sunburst.com/ProductInfo.aspx?itemid=176623#complete>

C⁶A³BI (Coastline Community College Comprehensive Cognitive-Retraining Curriculum for Adults and Adolescents

Coastline Community College © 1997

Coastline Community College
2990 Mesa Verde Drive East
Costa Mesa, CA 92626

Windows

Complete Package: \$1,500.00
Individual Components also available:
Assessment - \$500.00
Critical Thinking - \$250.00
Computer Section - \$250.00
Memory and Attention - \$375.00
Psycho-Social - \$500.00
Overview of C⁶A³BI Package - \$500.00

<http://www.coastline.edu/departments.cfm?LinkID=418>

Compensatory Memory Strategies

Parrot Software © 2004

Parrot Software, Inc.
P.O. Box 250755
West Bloomfield, MI 48325

Windows

CD Based Media:
Single license: \$99.95
Unlimited site license: \$500.00

Internet Subscription (includes access to ALL Parrot Software titles):

Single license: \$24.95/month
10 user license: \$49.95/month
30 user license: \$59.95/month
50 user license: \$69.95/month
200 user license: \$124.95/month

<http://www.parrotsoftware.com>

Conditional Statements

Parrot Software © 2004

Parrot Software, Inc.
P.O. Box 250755
West Bloomfield, MI 48325

Windows

CD Based Media:
Single license: \$99.95
Unlimited site license: \$500.00

Internet Subscription (includes access to ALL Parrot Software titles):

Single license: \$24.95/month
10 user license: \$49.95/month
30 user license: \$59.95/month
50 user license: \$69.95/month
200 user license: \$124.95/month

<http://www.parrotsoftware.com>

Cornel Critical Thinking Test

Critical Thinking Books & Software © 2001

The Critical Thinking Co.
P.O. Box 1610
Seaside, CA 93955-1610

Mac/Windows

50 tests, level x: \$99.99
50 tests, level z: \$99.99
100 tests, level x & z: \$ 159.99

http://www.criticalthinking.com/series/055/index_c.html

Developing Critical Reading Skills

Merit Software © 2007

Merit Software
121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Single user: \$78.00
Single computer (42 users): \$325.00
5 stations: \$1,125.00
5 stations networked: \$1,259.00

http://www.meritsoftware.com/software/developing_critical_thinking_skills/

Earobics

Cognitive Concepts © 1999

Cognitive Concepts, Inc
3800 Golf Rd. Suite 100
Rolling Meadows, IL 60008

Windows

\$329 per license

<http://www.earobics.com>

Editor in Chief

Critical Thinking Books & Software © 1999

The Critical Thinking Co.
P.O. Box 1610
Seaside, CA 93955-1610

Mac/Windows

Single license: \$64.99
10 user license: \$258.99
Unlimited Site License: \$ 895.99

http://www.criticalthinking.com/series/097/index_c.html

Essay Punch

Merit Software © 2007

Merit Software

121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Home version: \$29.00
Up to 6 users: \$115.00
Up to 25 users: \$235.00
Up to 50 users: \$449.00

http://www.meritsoftware.com/software/Copy%20of%20essay_punch_online/index2.php

Factory Deluxe

Sunburst Software © 1998

Sunburst Technology
1550 Executive Drive
Elgin, IL 60123

Mac/Windows

Single license: \$59.95
10 user license: \$159.95
Network/Site license: \$699.95

<http://store.sunburst.com/ProductInfo.aspx?itemid=176616>

Fast For Word Literacy

Scientific Learning © 2006

Scientific Learning
300 Frank H. Ogawa Plaza, Suite 600
Oaland, CA 94612

Mac/Windows

Single license: \$900.00

<http://www.scilearn.com>

Fast For Word Literacy Advanced

Scientific Learning © 2006

Scientific Learning
300 Frank H. Ogawa Plaza, Suite 600
Oaland, CA 94612

Mac/Windows

Single license: \$900.00

<http://www.scilearn.com>

Fast For Word Reading 1,2,3,4 and 5

Scientific Learning © 2006

Scientific Learning
300 Frank H. Ogawa Plaza, Suite 600
Oaland, CA 94612

Mac/Windows

Single license: \$900.00

<http://www.scilearn.com>

Focus on Grammar (Basic & Intermediate)

Exceller Software Corporation © 1994/95

Exceller Software Corp.
10999 Reed Hartman Hwy, Suite 330
Cincinnati, OH 45242

Mac/Windows

Single license: \$99.00
Five user license: \$300.00
Ten user license: \$500.00
25 user license: \$750.00
30 user license: \$900.00
40 user license: \$1,100.00
50 user license: \$1,250.00

<http://www.exceller.com/focus-on-grammar.html>

Grammar Fitness

Merit Software © 2007

Merit Software
121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Single user: \$78.00

Single computer (42 users): \$325.00
5 stations: \$1,125.00
5 stations networked: \$1,259.00
10 stations networked: \$2,159.00

http://www.meritsoftware.com/software/grammar_fitness/index.php

Grammar Games

Davidson & Associates © 1995

This product is no longer available as a stand-alone title, but has evolved into the Jump Start System products sold by Knowledge Adventure.

Knowledge Adventure
1311 Grand Central Avenue
Glendale, CA 91201

Windows

Multiple titles available in a variety of age and level groupings, ranging from \$19.99 to \$29.99

<http://shop.knowledgeadventure.com/Departments/JumpStart-Series.aspx?page=4>

Grammar Shape Up

Merit Software © 2007

Merit Software
121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Single user: \$78.00
Single computer (42 users): \$325.00
5 stations: \$1,125.00
5 stations networked: \$1,259.00

http://www.meritsoftware.com/software/grammar_shape_up/index.php

Inspiration

Inspiration Software, Inc. © 2007

Inspiration Software, Inc.

9400 SW Beaverton-Hillsdale Hwy, Suite 300
Beaverton, OR 97005-3300

Mac/Windows

Single License: \$69.00
Site Licenses available upon request.

<http://www.inspiration.com/store/main/index.cfm?fuseaction=insp.single>

Lindamood Phoneme Sequencing Program & Seeing Stars CD-ROM Series

Lindamood-Bell © 2007

Gander Publishing
412 Higuera Street, Suite 200
San Luis Obispo, CA 93401

Windows

Basic Collection: \$139.95
Many collections and pricing options, visit website for complete information.

<https://shop.ganderpublishing.com>

Locutour Attention and Memory vol 1

Learning Fundamentals © 1994

Learning Fundamentals, Inc.
1130 Grove Street
San Luis Obispo, CA 93401

Windows

Single Copy: \$189.00

<http://www.locutour.com/products/product.php?id=1>

Locutour Literacy

Learning Fundamentals © 2002

Learning Fundamentals, Inc.
1130 Grove Street
San Luis Obispo, CA 93401

Windows

Single Copy (3 CD Set): \$189.00

<http://www.locutour.com/products/product.php?id=9>

Math Cad 7 Standard

Mathsoft, Inc. © 1997

PTC Corporate Headquarters
140 Kendrick Street
Needham, MA 02494

Windows

Single: \$124.95

There are also different options for network, lab-based, and student-owned licenses. See the website for more information.

<http://www.ptc.com/appserver/mkt/products/home.jsp?k=3901>

Math Expert

Mathware Ltd, © 1997-2003

Mathware Ltd.
P.O. Box 3025
Urbana, IL 61803

Windows

Algebra Module: \$49.95

Algebra and Precalculus Modules: \$69.95

Algebra, Precalculus, and Calculus Modules: \$89.95

<http://www.mathware.com/mathxpert.html>

Math Playground

Mathplayground © 2007

No physical address available. Contact publisher via email at:
info@mathplayground.com

<http://www.mathplayground.com/index.html>

Mavis Beacon Teaches Typing

Broderbund © 2005

Riverdeep, Inc.
100 Pine Street, Suite 1900
San Francisco, CA 94111

Mac/Windows

Single Copy: \$29.95

<http://www.broderbund.com>

Memory Challenge

Critical Thinking Books & Software © 2005

The Critical Thinking Co.
P.O. Box 1610
Seaside, CA 93955-1610

Mac/Windows

Single License: \$64.99
10 user license: \$258.99
Unlimited Site License: \$ 895.99

http://www.criticalthinking.com/series/094/index_c.html

Mind Benders

Critical Thinking Books & Software © 1998

The Critical Thinking Co.
P.O. Box 1610
Seaside, CA 93955-1610

Mac/Windows

Single License: \$64.99
10 user license: \$258.99
Unlimited Site License: \$ 895.99

http://www.criticalthinking.com/series/013/index_c.html

Modumath

Wisconsin Technical College System Foundation, (WTCSF) Inc. © 2007

Wisconsin Technical College System Foundation, Inc.
One Foundation Circle
Waunakee, Wisconsin 53597-8914

Windows

Single license: \$195.00

<http://www.modumath.org/home/index.htm>

Parrot Chunking

Parrot Software © 2004

Parrot Software, Inc.
P.O. Box 250755
West Bloomfield, MI 48325

Windows

CD Based Media:
Single license: \$99.95
Unlimited site license: \$500.00

Internet Subscription (includes access to ALL Parrot Software titles):

Single license: \$24.95/month
10 user license: \$49.95/month
30 user license: \$59.95/month
50 user license: \$69.95/month
200 user license: \$124.95/month

<http://www.parrotsoftware.com>

Paragraph Punch

Merit Software © 2007

Merit Software
121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Single user: \$45.00
Single computer (42 users): \$199.00
5 stations: \$699.00
5 stations networked: \$849.00

http://www.meritsoftware.com/software/paragraph_punch_test/index.php

Parrot Memory demo

Parrot Software © 2004

Parrot Software, Inc.
P.O. Box 250755
West Bloomfield, MI 48325

Windows

CD Based Media:
Single license: \$99.95
Unlimited site license: \$500.00

Internet Subscription (includes access to ALL Parrot Software titles):

Single license: \$24.95/month
10 user license: \$49.95/month
30 user license: \$59.95/month
50 user license: \$69.95/month
200 user license: \$124.95/month

<http://www.parrotsoftware.com>

Pre-Algebra Shapeup

Merit Software © 2007

Merit Software
121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Single user: \$39.00
Single computer (42 users): \$179.00
5 stations: \$624.00
5 stations networked: \$699.00
10 stations networked: \$1,199.00

http://www.meritsoftware.com/software/pre_algebra_shape_up/index.php

Puzzle Master

Egames © 2007

Egames, Inc.
2000 Cabot Boulevard West, Suite 110
Langhorne, PA 19047-1811

Windows

Single Copy: \$19.99

<http://www.egames.com/gamepage.php?id=276>

Reading Shapeup

Merit Software © 2007

Merit Software
121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Single user: \$78.00
Single computer (42 users): \$325.00
5 stations: \$1,125.00
5 stations networked: \$1,259.00

http://www.meritsoftware.com/software/reading_shape_up/download.php

Revenge of Logic Spiders

Critical Thinking Books & Software © 2001

The Critical Thinking Co.
P.O. Box 1610
Seaside, CA 93955-1610

Mac/Windows

Single License: \$59.99
10 user license: \$236.99
Unlimited Site License: \$ 825.99

http://www.criticalthinking.com/series/008/index_c.html

Timez Attack

Big Brainz © 2007

Big Brainz, Inc
2476 N University Pkwy STE B1
Provo, UT 84604

Mac/Windows

Single License: \$39.99
School License: \$249-\$795.00
Limited "Base Version" available for free.

<http://www.bigbrainz.com/index.php>

The Time Warp of Dr. Brain

Sierra On-Line, Inc. © 1996

Sierra Entertainment
6060 Center Drive, 5th Floor
Los Angeles, CA 90045

Mac/Windows

No longer supported by Sierra, may be available on Amazon and Ebay.

<http://www.sierra.com>

Thinkalogy

Critical Thinking Books & Software © 1998

The Critical Thinking Co.
P.O. Box 1610
Seaside, CA 93955-1610

Mac/Windows

Single License: \$59.99
10 user license: \$236.99
Unlimited Site License: \$ 825.99

http://www.criticalthinking.com/series/089/index_c.html

Trig Explorer

Cognitive Technologies Corporation © 1996

MathRealm
5 Softweed Ct.
Potomac, MD 20854

Mac/Windows

Basic license (2 users): 39.95
Five users: \$259.95
Ten users: \$399.95
Twenty users: \$699.95
Site license: \$1199.95

http://www.mathrealm.com/Nav/FXInc/viewpage.php?url=..%2FCD_ROMS%2FTRIGExplorer.php&needle=trig+explorer

Ultimate Speed Reader

Knowledge Adventure, Inc. © 2005

Knowledge Adventure, Inc.
2377 Crenshaw Blvd., Ste. 302,
Torrance, California 90501

Windows

Single License: \$39.95

<http://www.smartkidssoftware.com/nddav41.htm>

Vocabulary Fitness

Merit Software © 2007

Merit Software
121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Single user: \$78.00
Single computer (42 users): \$325.00
5 stations: \$1,125.00
5 stations networked: \$1,259.00
10 stations networked: \$2,159.00

http://www.meritsoftware.com/software/vocabulary_fitness/index.php

Volcanoes

Corbis © 1996

Corbis
710 Second Ave. Suite 200
Seattle, WA 98104

No longer supported or available from publisher.

Voyage in Egypt

E.M.M.E. Interactive © 1994/95

This title is still available on Amazon.com, however there is no contact information for the publisher inside the U.S. and while the title is available for purchase, it is an unsupported title.

E.M.M.E. Main Office

40, rue Monceau
75008 Paris - France

Word Problem Shapeup

Merit Software © 2007

Merit Software
121 West 27th Street
Suite 603
New York, NY 10001

Windows

Complete Set Pricing:
Single user: \$78.00
Single computer (42 users): \$537.00
5 stations: \$1,797.00
5 stations networked: \$2,097.00
10 stations networked: \$3,597.00

http://www.meritsoftware.com/software/word_problem_shape_up/index.php

Word Q

Quillsoft © 2007

Quillsoft Ltd.
2416 Queen Street East.
Toronto, Ontario M1N 1A2
CANADA

Windows

Single License: \$225.00
Site licenses available, email for details.

<http://www.wordq.com/wordq2english.html>

Table 1.1: Cognitive processing areas capabilities comparison between software, part 1.

	Long Term Short Retrieval Term	Processing Speed	Auditory Processing	Visual Spatial Thinking	Comprehension-Fluid Knowledge/	Reasoning	Phonemic Awareness
Academic Challenge Cup	X						
Ancient Wisdom	X		X		X		
Attention and Memory vol 1 Locutour							
Building Perspective Deluxe				X		X	
CABI Review	X						
Compensatory Memory Strategies	X						
Conditional Statements					X		
Cornel Critical Thinking Test	X	X			X		
Developing Critical Reading Skills					X		
DR Brain	X	X	X	X		X	
Earobics		X	X			X	
Editor in Chief							
Essay Punch							
Factory Deluxe				X		X	
Fast for Word	X						
Fast for Word k-12 demo		X					
Fast For Word Literacy		X	X		X		X
Fast For Word Literacy Advanced	X	X	X		X		X
Fast For Word Reading 1,2,3,4 and 5	X	X	X	X	X	X	X
Focus on Grammar	X	X	X		X	X	X
Grammar Fitness							
Grammar Games	X	X	X	X	X		X
Grammar Shapeup				X	X	X	
Inspiration				X			

Table 1.2: Cognitive processing areas capabilities comparison between software, part 2.

	Long Term Retrieval	Short Term	Processing Speed	Auditory Processing	Visual Thinking	Spatial Knowledge/	Comprehension- Fluid Reasoning	Phonemic Awareness
LD Software Math Expert	X	X	X		X	X	X	
Lindamood Phoneme Sequencing				X				
Locoutour Attention and Memory	X	X	X	X				
Locoutour Literacy	X	X	X	X				X
Math Cad								
Math Expert								
Math Playground								
Mavis Beacon Teaches Typing					X			
Memory Challenge		X						
Mind Benders	X	X			X	X	X	
Modumath								
Paragraph Punch								
Parrot Chunking	X	X						
Parrot Memory demo	X	X						
Parrot Software		X						
Posit Brain Fitness	X	X	X	X	X			X
Pre-Algebra Shapeup								
Puzzle Master					X			
Reading Shapeup								
Revenge of Logic Spiders			X		X	X	X	
Thinkanalog							X	
Timez Attack								
Trig Explorer								
Ultimate Speed Reader								
Vocabulary Fitness								
Volcanoes	X	X		X				
Voyage in Egypt						X		
Word Problem Shapeup								
Word Q								

Table 2.1: Achievement processing areas capabilities comparison between software, part 1.

Achievement	Broad Reading			Broad Math			Broad Written Language			Academic Phoneme/ Oral Fluency Grapheme Language	
	Basic Reading Skills	Reading Comp	Reading Fluency	Basic Math Skills	Math Reason	Math Fluency	Basic Writing Skills	Written Expression	Written Language Fluency	Phoneme	Grapheme
Academic Challenge Cup											
Ancient Wisdom		X									
Attention and Memory vol 1 Locoutour											
Building Perspective Deluxe											
CABI Review											
Compensatory Memory Strategies											
Conditional Statements											
Cornel Critical Thinking Test	X	X	X								X
Developing Critical Reading Skills											
DR Brain											
Earobics											
Editor in Chief							X				
Essay Punch							X	X			
Factory Deluxe											
Fast for Word											
Fast for Word k-12 demo											
Fast For Word Literacy	X									X	X
Fast For Word Literacy Advanced	X					X	X		X	X	X
Fast For Word Reading 1,2,3,4 and 5	X	X	X		X		X	X	X	X	X
Focus on Grammar	X	X	X				X	X		X	X
Grammar Fitness		X					X	X			
Grammar Games		X					X				X
Grammar Shapeup		X					X	X			
Inspiration							X	X			

Table 2.2: Achievement processing areas capabilities comparison between software, part 2.

	Basic Reading	Reading Comprehension	Reading Fluency	Basic Math Skills	Math Reasoning	Math Fluency	Basic Writing	Written Expression	Written Language Fluency	Academic Fluency	Phoneme/ Grapheme	Oral Language
LD Software Math Expert					X							
Lindamood Phoneme Sequencing							X					
Locoutour Attention and Memory												
Locoutour Literacy	X		X							X		
Math Cad												
Math Expert				X								
Math Playground				X								
Mavis Beacon Teaches Typing									X			
Memory Challenge												
Mind Benders		X			X							
Modumath						X						
Paragraph Punch							X	X				
Parrot Chunking												
Parrot Memory demo												
Parrot Software												
Posit Brain Fitness												
Pre-Algebra Shapeup					X	X						
Puzzle Master												
Reading Shapeup	X		X									
Revenge of Logic Spiders	X	X		X	X							
Thinkanalogy												
Timez Attack				X								
Trig Explorer				X	X							
Ultimate Speed Reader	X	X										
Vocabulary Fitness		X	X									
Volcanoes		X										
Voyage in Egypt		X										
Word Problem Shapeup				X		X						
Word Q							X					

