A Practical Guide
for the Teaching of Literacy
to Adults With Learning Difficulties

Part III

Québec

A Practical Guide
for the Teaching of Literacy
to Adults With Learning Difficulties

Part III

Nomenclature of Learning Problems
(Causes and Consequences)

MAY 2002

Direction de la formation générale des adultes

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WHEN IT WORKS

INTRODUCTION

When Theresa tries to read, the letters seem to jump around or change shape. Jimmy reads fluently, but is unable to answer any questions about what he just read. Gina cannot spell a word or count to a hundred without making a mistake. Barney has never been able to remember the steps in long division. As for Josée…

Their instructor, Margot, suspects that they may be experiencing certain learning problems. This is not an area, however, that she knows much about, so she's looking for references or tools that can help her.

First of all, she would like to put names to the various types of errors she sees in her students' texts. Then she'd like to pinpoint the aspects of her program that may pose problems for adult learners. For instance, she wonders if she can anticipate complications that may arise in a writing workshop. She is also looking for explanations. She would like to know more about the causes of these problems. She's sure they are the result of learning problems, but she'd like to know what kind of impact these problems will have on her students' learning.

If you share Margot's concerns, this document is for you. It was designed to provide literacy instructors with labels for the various learning problems that may arise among adult learners during literacy training. The term "problem" encompasses learning difficulties and learning disabilities. The distinction between these two types of problems is explained in Part II, entitled *Learning Problems Among Adults: Difficulties or Disabilities*.

This guide is divided into three parts, each one addressing a basic skill area, namely reading, writing and arithmetic.

Each part is subdivided into three sections:

1. **WHEN IT WORKS** describes the skills required for an activity (reading, writing, arithmetic) to be successful, and explains the "normal" process involved in acquiring this knowledge.

2. **WHEN IT DOESN'T WORK** enumerates the problems that can arise in these areas of learning.

3. **POSSIBLE CAUSES** presents a number of hypotheses to explain the problems presented in the second section.

Margot therefore has at her disposal an additional tool to help her intervene more effectively among adults with learning problems. This document does not provide her with any tricks, techniques or teaching approaches. Rather, it acquaints her with the various technical concepts and terms that she will encounter in other works that do provide the tricks, techniques and approaches in the areas of reeducation and corrective action.

If you are like Margot and are new to the area of learning problems, we hope that this document will help you in your efforts and encourage you to learn more on the topic.

1. READING

WHEN IT WORKS

1.1. Reading

Here is a text:

> The information in this text was written long before you read it. You have access to it because the information is preserved through a process of encoding, known as writing. Encoding? Yes.
>
> What you see on this page—the printed words—are signs used to "encode" the information being transmitted. Writing is a code for talking. This code allows you to have access to the message without it having to be repeated out loud. If you understand this information, it is because you have mastered the code.

You've read the text. Perhaps, as you were reading it, you asked yourself: Where is this going? What does it mean? In short, you were searching to understand the text as you were reading it.

Reading is therefore the ability to extract information from a group of signs. It should be noted that our system of writing is **grapho-phonetic**, that is, the written signs (**graphemes**) represent sounds (**phonemes**). In spoken language, words can be broken down into component sounds—the phonemes. The left-right arrangement (in English writing) of letters in a word represent the series of sounds in time. In both spoken and written language, the words are organized into sentences (not randomly, but according to the rules of our language). The sentences themselves are organized into discourses. To fully grasp the process of reading, let's take a look at decoding and comprehension.

- **Decoding and comprehension**

  Decoding entails recognizing signs (letters and groups of letters) and knowing the spoken language sounds they stand for.

  Comprehension is more than simply pronouncing the written word. That is not enough to allow the reader access to the meaning of the text. For example:

  MACHAVA   LEVEDU   NYANYA

  It is possible for us to find a sound equivalent to these signs (that is to pronounce them), but since they have no meaning we cannot extract any information. The same can be said for an excerpt of a text on nuclear physics. Our limited knowledge of the vocabulary and concepts in this field hinders our comprehension.

Reading therefore involves two processes:

◊ identifying the sound equivalents to written signs
◊ searching for the meaning of these signs

While reading specialists recognize two processes, they are divided on their relative importance.

For some, the question of the exact and complete representation of a word's sound equivalent is marginal to the reading process. These specialists demonstrate that many errors can be made, without distorting the meaning of the text. And they argue that it is not essential to perceive every sign: good readers can "skip" words and still have direct access to meaning, without having to search for the sound equivalent of graphemes. In fact, if it were necessary to search for the exact and complete recognition of a word's sound equivalent, it would slow down reading and likely hinder comprehension.

Other writers insist, however, on the importance of this step as a prerequisite to comprehension.

- **Perceptive and cognitive dimensions**

As mentioned previously, reading can be defined as the ability to extract information contained in a written text. This skill requires control of a certain number of actions which can be grouped into two major categories:

Perception:

◊ Seeing written signs clearly and accurately: This requires visual acuity, visual tracking (the ability to move the eyes smoothly along the printed page in order to follow a text), visual discrimination (the ability to see small differences in letters, numbers and written words), visual-motor capabilities (the ability to coordinate seeing and moving), and so on.

◊ Noticing the characteristics of the individual signs and telling them apart: Written signs are letters formed by lines arranged differently in space. For example, to recognize a /p/, the reader must correctly perceive that this letter is composed of a vertical line and a ball-shape protruding to the right, not the left, and from the top, not the bottom, of the line.

◊ Registering the order of the letters: We read from left to right. It is the left to right arrangement of letters that represents the sequence of sounds of which a word is composed. If dog is read as god, the meaning is drastically changed.

◊ Recognizing the spoken equivalence of these signs: It should be noted that a reader's ability to pronounce a word does not necessarily lead to comprehension of its meaning. Take the sentence 'He was eating some <u>cadoru</u>'. The unknown word, cadoru, can be pronounced, but deciphering its meaning in that sentence calls for another process.

Cognition:

◊ Finding the meaning of the word requires:

    a) storing the information in short-term memory (also called working memory)

    b) searching for its meaning in long-term memory

    c) "storing" this information in long term-memory in order to gradually construct the general meaning of the text

◊ Anticipating or predicting the words to follow (based on context or syntactic clues).

◊ Confirming or modifying hypotheses as the reading proceeds.

◊ Linking information obtained with that already stored in memory.

At a more advanced skill level, readers are able to "process" the information they have extracted from the text. They are able to find specific information in the text, choose from among many elements those that correspond to their needs, gather scattered data and deduce information based on data contained within the text. This involves locating, selecting, grouping and inferring, in that order.

1.2. Learning to read

Reading is therefore a more complex activity than simply decoding grapho-phonetic association. Knowing how to read entails exercising a series of cognitive skills in order to grasp the **meaning** of the text. While decoding is one of those skills, reading cannot be reduced to that alone. In fact, a good reader does not have to perceive every letter in a text to understand it. Just a few graphic signs suffice. Consequently, learning to read is not simply a question of learning to translate written signs into sound, but also to increase one's capacity to discover their meaning.

This capacity, except in certain very rare cases, does not increase as a result of simple contact with written material. In most cases, reading must be "taught," that is, a series of specific conditions must be put in place so that what is written can take on meaning for the new reader. Many specialists have studied these conditions and attempted to

determine which are most conducive to learning, resulting in the development of various models for learning and teaching reading. These models are based primarily on various trends in psychology, linguistics and pedagogy.

- **Learning and teaching models**

  Giasson and Thériault (1983) have classified these models as follows:

  ◊ **"Bottom-up" models** propose an introduction to grapho-phonetic code (letter, syllable) before moving on to decoding words and sentences. Comprehension is the last step in this process.

  ◊ **"Top-down" models** favour the presentation of complete units of meaning, in which sentences are the main focus. Grapho-phonetic association is not taught systematically.

  ◊ **"Interactive" models** place emphasis on the variety of strategies used by the reader to understand a text. Although the emphasis here is on meaning, decoding is nevertheless recognized as an essential aspect of the reading process in some situations. Consequently, decoding is taught, but the goal is always comprehension.

  It must be stressed that while these models propose different approaches to learning to read, they are designed to obtain the same results: comprehension of texts.

  Consequently, "if it works," the adult learners will understand the written material presented to them because they will have all the skills they need for reading, regardless of the order in which they acquired them. However, "if it doesn't work," that is, if they do not succeed in mastering reading, what went wrong?

WHEN IT DOESN'T WORK

1.3. Problems learning to read

- **Causes or factors**

  While reading may seem to be a very complex mental activity, it is within reach of most six-year-olds, assuming they are placed in suitable learning conditions. Why then is it so difficult for some people?

  There is no single answer to this question. Numerous and varied factors contribute to learning problems in reading.

For instance, affective, cultural or social factors can hinder the normal learning process. Just think of the impact of behavioural difficulties, family problems, emotional instability or low self-esteem on an adult's readiness to learn. The opposite may also be true: learning problems may be at the root of the above-mentioned factors.

The teaching method may also be deficient. For instance, instructors who limit their teaching to briefly presenting a few words, without reference to code or context, may lead adult learners to use insufficient clues to recognize words. For instance, learners may limit themselves to spatial elements. In a reading situation, therefore, they would focus on the length or spatial configuration of a word to determine what word it is. But outside of class, this clue becomes useless!

That said, even if the adult learner is not experiencing any major social or psychological challenges, and the teaching approach is adequate, learning to read can still be difficult. The learner may, for instance, constantly repeat the same errors, which could lead the instructor to suspect that the adult has learning problems. These are "typical" problems which will be explored further on.

Before listing the possible errors, it is important to point out that any adult learning to read can make any of these errors. All learning entails some risk and in any learning situation, there is always the risk of making a mistake. These errors are not always an indication of a "pathology." What distinguishes someone learning to read from someone with learning problems is the number, frequency and persistence over time of these errors.

It is therefore very important to make a distinction between **elementary mistakes** and **persistent mistakes**.

Elementary mistakes are errors that are an inevitable part of learning how to read and usually disappear over time.

Persistent mistakes, or mistakes that recur, prevent any form of automatism on the part of the reader.

- **Decoding problems**

The learners must be able to distinguish different phonemes (sounds including consonants and vowels) before they begin to learn how to read. Then as they learn how to read, they must be able to adequately relate visual symbols to their corresponding sound.

Some adult learners, however, seem unable to recognize letters or to find the oral equivalent of combinations of letters. While anyone (even very good readers) can

make errors in decoding, the accumulation of such errors could eventually lead to comprehension problems. Errors related to decoding are described in the following pages.

◊ **Confusion (errors in auditory or visual discrimination)**

Adult learners exhibiting these types of problems confuse sounds when reading. These are **errors in auditory discrimination** (De Maistre, 1970).

The sounds of English are classified as vowels and consonants. Vowels are sounds made with no obstruction of air, and may be classified by the degree to which the mouth is opened, the position of the highest part of the tongue (front versus back), and the position of the lips (round versus unround).

Consonants, where the air is more or less obstructed may be classified according to:

a) degree of obstruction (plosives or stops—where obstruction is complete; fricatives—where the obstruction is only partial and produces friction)
b) voiced (where vocal cords are vibrating); or voiceless (no vibration)
c) place at which the obstruction occurs—the lips (bilabial consonants); the teeth or alveolar ridge (behind the teeth); the palate
d) nasality—where the air resonates through the nasal cavity ('m' and 'n')

I. Errors related to difficulties in auditory discrimination (sounds that are produced similarly—either because of place articulation or voicing or manner of stopping the air) have similar auditory characteristics. People with learning disabilities or people whose native language is not English may have trouble learning to tell some sounds apart:

a) Confusion between voiceless and voiced consonant sounds:

plosives or stops (these are sounds produced by completely obstructing the air passage):

Voiceless	Voiced
/p/	/b/
/t/	/d/
/k/	/g/

fricatives (where the obstruction is only partial and produces friction):

Voiceless	Voiced
/f /	/v/
/s/	/z/
/th/ (as in thin)	/th/ (as in the)

b) Confusion among plosive consonants:

voiceless: p - t, t - k, p - k
voiced: b - d, b - g, d - g

c) Confusion among consonants where point of obstruction is the same:

bilabial: m - b - p (sounds made by stopping the air at the lips)
alveolar: n - d - t (sounds made by stopping the air at the ridge behind
                        the teeth).

d) Confusion between nasal consonants: m – n

e) Confusion among vowels, particularly:

/a/ - /e/
/i/ - /e/
/o/ - /u/

*   These kinds of confusions affect learning to read when the student does not
    clearly differentiate or remember the sound that is associated with a written
    symbol, or when a word sounded out does not match the version the student
    has internalized.

II. Errors related to difficulties in visual discrimination

a) Confusion between letters that differ only in their orientation:

u - n
p - q   b - d

b) Confusion between letters that are similar in visual features and speech
sound:

b - d (voiced plosive)
m - n (voiced nasal)

c) Confusion between letters that are similar in their visual features

a (*a*) - d
o - a (*a*) (due to the rounded form)
f - t (due to the stroke)
a (*a*) - e (when typed)

◊ **Insertion**

The reader may add sounds to a word (e.g. "brook" for "book"), or a syllable to a word (e.g. "auto**ro**mobile" for "automobile"), or words to a sentence (e.g. "my son eats **too** quickly" instead of "my son eats quickly.").

◊ **Reversals, rotations and transpositions**

The reader may make errors by reversing certain letters that are in some way analogous in form. These letters share the same lines but different orientations. This is called a **rotation error**.

There are four types of rotation error:

Horizontal:	d - q	f - t
	b - p	e - a (*a*)
	n - u	A - V
	w - m	
Vertical:	d - b	z - s
	q - p	g or q - p
Depth axis:	p - d	u - h
	h - y	b - q
	t - r	b - g - q
Internal axis:	n - z	

There are also **transposition errors**. In a given word, sounds are reversed (e.g. "sliver" for "silver") or syllables (e.g. "au**mo**tobile" for "automobile").

◊ **Omission, elision or suppression**

The reader may forget to decode sounds in a word (e.g. "norma" for "normal"), syllables in a word (e.g. "gage" for "ga**ra**ge"), or words in a sentence (e.g. "I want to eat for breakfast" for "I want to eat **cereal** for breakfast"). The adult learner may even skip sentences or lines altogether.

◊ **Substitution**

Certain readers with learning problems may replace a sound in a word (e.g. "sillow" for "pillow"), a syllable in a word (e.g. "re**ta**tion" for "relation") or a word itself (e.g. "train" for "skate"). This kind of error is different from rotation errors. In the case of substitution, the sound, syllable or word has no analogy with the usual difficulties associated with auditory or visual discrimination.

◊ **Repetition**

The adult learner repeats the same sound in a word (e.g. "**w** – wall") or the same syllable in a word (e.g. "gara**ra**ge").

- **Comprehension problems**

As we have already seen, text comprehension depends on a series of cognitive skills. A nomenclature of reading problems would be incomplete if it were restricted to "decoding."

The major problems related to reading comprehension are divided into the following categories: use of context, locating and selecting, synthesizing, inference and chronology.

◊ **Use of context**

Understanding a word depends in large part on the use of context. For instance, in the sentence "He would like some ………. with his hot dog," the word "fries" is most likely to come to mind. Readers who have difficulties decoding this word could use the context to understand the sentence. The ability to use context, however, may be limited among some adult learners.

◊ **Locating and selecting**

Locating refers to finding specific information in a text, and selecting means choosing relevant information from a range of data. Certain readers also have problems in these areas, which hinders their understanding of the text.

◊ **Synthesizing**

When looking for information scattered in a text, or in several texts, some readers may not be able to extract all the information. These individuals have problems in synthesizing information that comes from several sources.

◊ **Inference**

Sometimes, not all information is explicitly stated in a text. The ability to deduce information on the basis of several elements is called inference. Some readers are not able to carry out this operation. For instance, in a story containing the statement, "If she hadn't had her umbrella, she would have been soaked," the reader would not be able to determine the weather.

◊ **Chronology**

Other readers have problems reconstituting chronological order or a sequence of events.

POSSIBLE CAUSES

There are a number of hypotheses as to the causes of these problems. Keep in mind that in many cases, errors made by students learning to read are simply part of the normal learning process. However, when these errors become systematic, that is, they arise every time the adult learner reads, and they persist over time, the possibility of learning disabilities should be considered.

In order to learn, the adult learner requires good cognitive tools, among other things. These tools are based on three operational units: alertness and attention (unit 1); cognitive processes, including perception, memory and language (unit 2); and planning a task (unit 3).

It is essential to note that the ability to learn requires that all of these elements come into play in a dynamic and interdependent fashion.

Dysfunction, if any, will manifest itself through learning problems. If deficiencies persist, even following appropriate educational intervention, specific learning disabilities are likely a factor, which can be confirmed through standardized testing.

1.4. Alertness and attention (unit 1)

Alertness indicates the adult learner's readiness to learn. It allows the learner to enjoy good selective attention (to discriminate between useful stimuli and stimuli that could be distracting) and sustained attention (maintaining concentration for a relatively long period).

Attention deficit is therefore the partial or total inability to focus attention on a specific "object." This can lead to learning problems in reading. Omissions, substitutions and insertions can be the result of limited visual attention span.

1.5. Cognitive processes (unit 2)

To process or integrate information, that is, to receive, analyze and memorize it, learners require two cognitive processes: the sequential process and the simultaneous process. Perception, memory and language are basic elements necessary for the proper functioning of these processes.

- **Sequential process**

  The sequential process involves the synthesis of separate stimuli in linear, temporal order. It can be compared to the construction of a chain, in which each link is dependent on the one that precedes it and the one that follows it. This process favours auditory elements and relies on short-term memory to be efficient.

  ◊ **Auditory perception**

  Auditory perception involves the organization of information gathered by the auditory system. Even if an adult learner's auditory system does not seem to be damaged, this person may have problems recognizing certain sounds, while not hearing others at all. Specialists have identified a link between poor perception of phonemes and reading problems related to omission, substitution and insertion. It is hypothesized that confusing sounds is due to poor auditory discrimination. The adult learner is unable to detect differences between certain sounds and therefore perceives them as "equivalent."

  ◊ **Auditory memory**

  Auditory memory relates to the recording, retention and recall of auditory information (sound, words, noise, music), with or without clues.

  A "defective" auditory memory can make reading a very arduous process: the adult learner may, for example, confuse a sound or word with a similar sound or word since it is difficult for this person to associate the correct letter with the correct sound.

◊ **Language**

Language plays a very important role in reading. Receptive language involves the reception and comprehension of what is said.

Expressive language allows thoughts to be communicated through words and sentences.

When reading, the adult learner may have problems if the text is without meaning, is too complex, or contains too many unknown words.

● **Simultaneous process**

Simultaneous process can be described as the synthesis of several interrelated elements into a group. One element of this group cannot exist alone but is part of a whole—the whole being its point of reference. This process involves visual elements and is based on reasoning.

A deficiency in the simultaneous process leads to serious problems in reading comprehension.

◊ **Visual perception**

Visual perception involves the organization of information gathered by the visual system. Even if the adult learner's visual system does not seem to be damaged, this person may have problems recognizing certain symbols (letters), and not see others at all.

Adult learners with deficiencies in visual perception have problems associating a letter (visual symbol) with its corresponding sound.

◊ **Visual memory**

Visual memory relates to the recording, retention and recall of visual information (letters, drawings, symbols), with or without clues.

A deficiency in visual memory can make reading very difficult, as the reader will have problems remembering how to translate a given letter or group of letters into a sound or a word.

◊ **Language**

To translate a visual task or problem, the adult learner must resort to language or visuo-spatial elements.

Deficiencies lead to poor comprehension of concepts such as grammar and geometric shapes.

1.6. Planning a task (unit 3)

When adult learners are confronted with a task, several operations are called into play due to the number of strategies involved. They must motivate themselves, carry out the task by referring to what they already know, what they must learn and how they will organize themselves to learn. Before concluding that the task was properly executed, they must verify their work to make any necessary adjustments or corrections. This is called "learning how to learn" or metacognition.

Finally, it is important to point out that learning problems arise when sequential and simultaneous processes do not occur harmoniously. Furthermore, one process does not take precedence over the other. To the contrary, adult learners decide which process to prioritize, on the basis of their cognitive functioning and the demands of the task before them.

2. WRITING

WHEN IT WORKS

2.1. Writing

I must write a text on writing. But how?

This text must be a structured series of signs that communicates a message, not a random string of letters.

To begin with, certain characteristics must be defined: Who is my audience? What do I want to say? And so on.

Once this information has been established, I can begin writing. Here, certain constraints apply: I must remain focused on the topic, be clear, and follow the rules of semantics, syntax, grammar, spelling, etc.

If you can read my text, it means you recognize the signs being used. To be sure, I must pay careful attention to properly rendering the form of the letters.

Writing is therefore based on three types of skills:

- the ability to assemble relevant information in the writing project
- mastery of the language, that is, the ability to clearly communicate the message (choice of vocabulary, construction of sentences, organization of the message, etc.)
- knowledge of the correct rules of writing (grammar, spelling, punctuation, etc.)
- mastery of the medium (properly writing out the characters or using a keyboard)

2.2. Learning to write

Learning to write is learning to communicate in written form. It is not simply a question of knowing how to properly render letters on paper or how to form words that are dictated.

As we saw, decoding is one technique in reading that contributes to comprehension. Similarly with writing, "dictation" is **one** situation, and mastering spelling is **one** aspect. In no way do dictation and spelling replace the most fundamental aspect of writing: communication.

The orientations presented in *A Guide to Customized Literacy Training* are part of a teaching trend in which writing is taught as a succession of real communication situations.

Writing requires the mobilization of a number of skills, involving factors such as intellectual and language development as well as psychomotor development.

- **Intelligence and language**

  A heightened ability to communicate in written form is determined in great part by mastery of oral language. The greater the ability to manipulate words, the easier it will be for the learner to clearly organize a message. Furthermore, the greater the learner's intellectual capacity, the better his or her mastery of rules of syntax, grammar and spelling.

- **Grapho-motor skills**

  Grapho-motor skills—the capacity to write or form letters—are a fundamental aspect of writing. Regardless of the mode used to align the letters (by hand or using a computer), adult learners must acquire a series of skills that will enable them to coordinate their intent with their physical action.

  Writing instruction therefore involves imparting these skills. That said, anyone who knows how to write (minutes of meetings, a term paper, a love letter) knows that there is always room to perfect these skills.

WHEN IT DOESN'T WORK

2.3. Problems learning to write

As with reading, affective or social factors can hinder the process of learning to write. And errors (the "mistakes" so dreaded by adult learners) are part and parcel of the risks one takes when learning. Usually, they are the result of lack of practice rather than a sign of serious problems.

Two problems can be observed in the process of learning to write: spelling problems and problems in organizing the message.

- **Spelling problems**

  There are three types of spelling problems: phonetic errors, errors in usage and grammatical errors.

  ◊ **Phonetic errors**

    Misspellings result from five different kinds of problems in transcription, and occur when the writer has difficulty analyzing the sequence of sounds in a word, or has not completely learned the sound-symbol equivalents:

⟹ Confusion

The writer confuses similar sounds and chooses a letter that represents the wrong sound (e.g. "fault" for <u>vault</u>).

⟹ Insertion

The writer adds a sound or a syllable to the word (e.g. "bananana"; "brook" for <u>book</u>).

⟹ Transposition

The order of letters in a word is changed ("framer" for <u>farmer</u>; "natoin" for <u>nation</u>).

⟹ Omission

A letter or syllable is omitted (e.g. "bave" for <u>brave</u>; "invition" for <u>invitation</u>).

⟹ Substitution

The wrong grapheme is used, but this replacement cannot be explained by similarity of sound between the elements (e.g. "mum" for <u>mud</u>).

◊ **Errors in usage**

These occur when the writer has not mastered the conventional spellings. The writer sets down a plausible sound equivalent for a word, but it is not the conventional one (e.g. "kof" for <u>cough</u>). These errors can include:

⟹ Confusion of homophones (e.g. "no" for <u>know</u>; "see" for <u>sea</u>).

⟹ Omission of a conventional element (e.g. the final "e" required for the correct pronunciation of a long vowel: "fin" for <u>fine</u>).

⟹ Grammatical errors

Language is made up of words which are governed by a series of rules. Learning a language is not limited to acquiring a vocabulary, but involves mastering all of the rules that govern the organization of a sentence.

Grammar is the system of forms and uses of words in a given language. It encompasses the exact meaning of a word, its spelling, role and relationship with other words in a sentence.

Although a full discussion of grammar is beyond the scope of this work, grammatical spelling errors result from the transcription of a word that results in the absence or incorrect application of a rule of grammar (e.g. "knowed" for <u>knew</u>).

- **Problems organizing the message**

While spelling problems certainly deserve all the attention they receive in corrective teaching, they are only one type of problem that arises when learning how to write. As we have seen, writing is not limited to correct transcription.

One of the greatest challenges related to the teaching of writing is allowing the adult learner to communicate in writing, which involves the acquisition of skills necessary to express one's thoughts. This undertaking presents its own set of problems.

◊ **Problems related to language development**

A limited vocabulary and poor grasp of the rules of syntax are common among adults who are learning to write.

◊ **Problems related to the writing project**

⇒ Type of discourse

Certain problems are related to understanding the constraints that govern different types of discourse. Some adult learners have difficulties understanding the nuances that distinguish a personal letter from a report, for example. They may also have difficulties defining what they wish to communicate, and will digress or leave out essential points.

⇒ Audience

There are also problems related to adapting the text to the audience. The tone and form of the discourse must be adapted to the context. For instance, does the writer know the audience? Is the audience familiar with the situation being described? Certain adult learners have a tendency to overestimate their audience's level of knowledge which can reduce the clarity of their message.

⇒ Organizing the text

Clarity may be reduced if the text is poorly organized:

- words left out or repeated in a sentence
- errors in separation of words (e.g. **thegirl** is playing with **aball**)
- sentences that are too long or poorly separated due to improper use of punctuation
- failure to use, or incorrect use of, pronouns, link-words, etc.
- no paragraphs

POSSIBLE CAUSES

These problems may arise simply because the adult is learning to write. Learning to write is a long process involving many complex and subtle rules. Problems may also result from lack of practice.

2.4. Problems in attention span

Writing requires an enormous degree of attention and concentration. Adult learners who have difficulties focusing their attention, that is, they are distracted by external stimuli while they are writing, find it takes a great deal of effort, and a lot of concentration, to complete a task.

Problems with attention, both in terms of selective attention and sustained mental effort, affect all aspects of writing.

2.5. Cognitive processes

- **Sequential process**

  Deficiencies in the sequential process can affect the adult learner's ability to associate letters with their sounds, to pronounce syllables, spell, learn grammar rules and remember the details and sequence of events in an account.

◊ **Auditory perception**

  Perceptual deficiency accounts for certain types of spelling problems. Confusion and substitution of graphemes may be the result of poor auditory discrimination. The adults learner writes "fault" for "vault" because in his or her perception, the sound /f/ and the sound /v/ are equivalent in spoken language.

◊ **Auditory memory**

Auditory memory plays an important role in writing, and its improper functioning can hinder learners' ability to correct themselves.

◊ **Language**

Grammar is defined as the study of elements that constitute language, their formation, role and how they interrelate. Learning the rules requires prior understanding of their meaning and the ability to remember them when writing.

● **Simultaneous process**

Deficiencies in the simultaneous process can, among other things, affect visual recognition of known words and comprehension of the text, namely difficulties in making logical connections, using context to understand, comparing, evaluating and summarizing.

◊ **Visual perception**

Poor visual perception can hinder learners' ability to correct themselves. As we have already seen, limited visual perception can lead to reading problems. Consequently, learners are not able to perceive errors in rereading their own writing.

◊ **Visual memory**

Visual memory is essential in developing spelling skills. Even in the absence of perceptual problems, limited visual memory affects spelling.

All forms of phonetic errors can be linked to poor functioning of visual memory: confusion, substitution, omission, insertion and errors in usage.

◊ **Language**

Adult learners who have difficulties making logical connections or have limited memory of logical relations have problems applying rules of grammar to writing.

2.6. Grapho-motor difficulties

Psychomotor factors can affect motricity in writing. Problems in posture and motor coordination can make learning to write difficult. Hand movement may be limited by deficiencies in fine motor control and problems in visuo-motor (eye-hand) coordination may lead to difficulties in writing.

3. ARITHMETIC

WHEN IT WORKS

3.1. Arithmetic and literacy

While learners may master the techniques of reading and writing after a few years of study, which then leaves them with perfecting those skills, it is a completely different matter with arithmetic.

Arithmetic is a science, that is, a body of knowledge obtained and verified by experiments and structured according to a series of principles and laws. Arithmetic is therefore the study of abstract concepts and their relationships.

Arithmetic in the context of a literacy program is focused on basic concepts and techniques. The stated orientation of literacy activities in *A Guide to Customized Literacy Training* suggests a process in which adult learners are encouraged to identify situations in their everyday lives that require the use of mathematical techniques (for example, calculating or measuring). The purpose is therefore to learn to use arithmetic to solve concrete problems, not to introduce the concepts, problems and theories of pure mathematics.

3.2. Learning arithmetic

For our purposes, learning arithmetic means:

- **Mastering the concept of numbers**

  This skill is more complex than simply counting. The adult learner must be able to read and write numbers, arrange them in order, know the place values of digits, transform numbers (form a number, break down a number).

  The concept of numbers is essential to learning the four basic operations.

- **Mastering the four basic operations**

  Calculating requires adult learners to constantly form and break down numbers. For example, borrowing or carrying over have no meaning if the concept of numbers is unclear.

  Furthermore, mastering basic operations assumes a capacity to use them in the proper context. Problem-solving is an effective method to foster this ability.

- **Mastering the International System of Units**

  This entails properly using measuring instruments and knowing the units of measurement and their relationships.

- **Introduction to geometry**

  Adult learners must recognize basic geometric forms and, if they plan to pursue their studies, become familiar with basic concepts of geometry.

WHEN IT DOESN'T WORK

While arithmetic focuses on the study of abstract concepts and their relationships, it has very concrete applications which are accessible to the average person. Yet adult learners often have a very different impression. Everyone knows that if I have $125 and I earn another $3 it is absolutely impossible that I have only $11 in my possession. However, answering 11 to the equation $125 + 3 = \ldots$ is not uncommon in class and attests to the difficulty of imparting to learners an understanding of the operations they are carrying out.

Many adult learners have difficulty making the transition from the concrete (manipulating objects) to the symbolic (manipulating symbols). This is generally because they were not properly taught how to do so; and not the result of cognitive deficiencies—an often tempting conclusion.

That said, learning problems can hinder the learning of arithmetic. Below is a description of these problems and the kinds of errors they typically produce. Instructors should, however, proceed carefully when using this information. Questioning their own teaching methods could reveal equally fruitful intervention strategies.

3.3. Problems learning arithmetic

- **Concept of numbers**

  ◊ **Problems understanding the numeration system**

    The modern numeration system is based on "decimals," that is, on the number ten. Numbers are grouped by tens. Thus, 42 signifies four groups of ten and two ungrouped units; 851 signifies eight groups of ten groups of ten, five groups of ten and one ungrouped unit.

    Some adult learners have difficulties grasping the meaning of these groups or recognizing the value of a symbol on the basis of its position within a number. Learners find it difficult to make the transition from groups of ones to tens, and from tens to hundreds.

◊ **Problems reading or writing numbers**

Some adult learners who can assemble and disassemble groups by manipulating objects are unable to retain the name of the symbols representing the result of their manipulations. They will say "seven" and "one" for 71 (that is, seven groups of ten and one unit) or write 701 to express seventy-one units.

◊ **Problems putting numbers in sequential order**

Some adult learners are unable to express numbers in sequential order or organize them in increasing or decreasing order.

● **Operations**

◊ **Problems understanding the meaning of operations**

Operations are the manipulation of objects in symbolic form. Adding, means to add one quantity to another. Subtracting, means to remove from or determine the difference between two quantities, and so on.

Some adult learners have difficulty making the transition from concrete manipulation to mental representation.

◊ **Problems using techniques**

Some adult learners have problems remembering all the steps in an operation. Others confuse place value and, for example, add all the numbers (whereby $125 + 3 = 11$). Others are unable to remember the basic operations tables.

◊ **Problems solving problems**

These problems arise from the inability to grasp the meaning of a problem, to distinguish between different components and to choose the appropriate operation.

● **Measurement**

Problems related to learning the system of measures are related to the following points:

◊ estimating lengths
◊ retaining units of measure
◊ establishing ties between units
◊ using measuring instruments

- **Introduction to geometry**

  The main problems that tend to arise at the beginning of the learning process are retaining the names of geometric shapes and reproducing these shapes.

POSSIBLE CAUSES

3.4. Problems in attention span

Problems in attention span affect all types of learning. In arithmetic, these problems can be compensated for, in part, by using concrete material, although manipulation comes with its own set of problems. Adult learners can become distracted by the colour or type of material or by the noise produced when it is manipulated.

3.5. Cognitive processes

- **Sequential process**

  Deficiencies in the sequential process can have repercussions on the capacity of an adult learner to enumerate numbers, understand different components of a drawing and thereby isolate the geometric form, and solve problems step by step.

  ◊ **Auditory perception**

    Adult learners may exhibit deficiencies in situations where they must, for example, perceive the names of numbers (e.g. "thirteen" instead of "thirty").

  ◊ **Auditory memory**

    Adult learners may have problems spontaneously recalling numbers. It is impossible for them to remember the steps to follow to solve a problem and to recall the numbers preceding or following a given number.

  ◊ **Language**

    Adult learners may not understand the language used to express arithmetic. They do not grasp the meaning; in other words, basic concepts (e.g. before, after, as many, equal) do not correspond to anything or are confused.

    Poorly integrated concepts of time, space or quantity can compromise the adult learner's ability to learn arithmetic. Given that arithmetic is the study of abstract

concepts, it is clear that the more limited an adult learner's capacity to conceptualize, the harder it will be to teach him or her arithmetic.

Furthermore, some adult learners are unable to follow the sequence required to carry out an operation.

- **Simultaneous process**

Deficiencies in the simultaneous process can hinder comprehension of the general meaning of a problem in arithmetic.

◊ **Visual perception**

In terms of visual perception, adult learners may have problems of figure-ground, visual discrimination (reversal in number recognition: 2-5, 6-9, confusion between coins, between signs for operations: +, -, x, ÷, confusion between the big hand and small hand on a watch) and spatial orientation (reproduction of geometric shapes, alignment of numbers to carry out an operation).

◊ **Visual memory**

Adult learners with visual memory deficiencies in arithmetic have difficulties remembering the shapes of numbers and geometric forms, body image (or kinesthetic sense), as well as counting backwards, counting by 2s, by 3s, etc.

◊ **Language**

In terms of the simultaneous process, language plays an essential role in that it enables an understanding of the "history" of the problem so that it can then be solved.

3.6. Grapho-motor difficulties

Adult learners with grapho-motor problems may have difficulty writing numbers. Very often, they have difficulty aligning numbers in columns in order to perform operations.

PART III

NOMENCLATURE OF LEARNING PROBLEMS
(CAUSES AND CONSEQUENCES)

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