Self-regulated learning procedure for university students: the *meaningful text-reading* strategy

José María Román Sánchez

Faculty of Education. University of Valladolid.

Spain

jmroman@psi.uva.es

Abstract

Introduction. Experimental validation of a self-regulated learning procedure for university students, i.e. the "meaningful text-reading" strategy, is reported in this paper. The strategy's theoretical framework is the "ACRA Model" of learning strategies. The strategy consists of a flexible, recurring sequence of five mental operations of written information processing (books, articles, notes, etc.) which facilitate semantic storage of conceptual, theoretical knowledge: linear underlining, paraphrase elaboration, identification of text structures, self-questioning and elaboration of a conceptual map.

Method. The experimental study was performed with first-, third- and fifth-year university students during normal class hours and in the classroom. Three experimental groups and three control groups were administered a pre-test, postest, and follow-up. Learning strategies were measuring through self-observation (ACRA Scales) and through assessment of the execution performed on given texts.

Results. Data show that the self-regulated learning procedure called the "meaningful text-reading" strategy can be taught in two to three classes for later use in instructional activities focused on autonomous learning.

Discussion. Experimental and experiential evidence answers the following questions: (1) Does the training procedure increase mastery of the strategy? (2) Are the effects of training transferred? (3) Three months later, do effects of the training persist?

Keywords: procedures for university students, learning strategies, ACRA model, self-regulated learning, meaningful reading strategy.

Introduction

The teaching of learning strategies is not limited to students in primary or secondary school; strategies can be taught at university and even in early childhood education (Pramling, 1990; Muñoz, 2003). Notwithstanding, the "critical period" could be placed at 11 to 14 years.

If we accept the hypothesis that the principal cognitive processes involved in information processes are *acquisition, codification* and *recovery* (Rigney, 1985), then cognitive learning strategies could be defined as *effective sequences of mental operations that we use to acquire, retain, recover and use different types of information.* Or likewise: as forms or ways to optimize the functioning of cognitive processes.

This is a basic hypothesis which underlies informativist models, in often-forgotten theories of the mental representation of knowledge through *propositions* or ideas (propositional system), through mental *images* (analogical system), through *productions* or rules of action (procedural system) and through kinesthetic *sensations* (enactive system). Greatly simplifying, these models hypothesize that the brain works "as if" cognitive processes of (a) acquisition, (b) codification and (c) recovery were located in itself. On the other hand, for full performance of this cognitive system, the collaboration of processes of an affective and social nature, (d) support processes, are also required. All these processes in turn are planned, evaluated and regulated by (e) metacognitive processes.

From available knowledge about each process, forms or ways to manipulate them can be deduced (control and directon). That is, procedures that allow optimizing, teaching, preventing or correcting their adequate functioning. These mental processes or managing strategies are usually observable, publicly or privately, by comparison to processes, which are explainatory constructs (Figura 1) (Román, 1990, 1993, 1994).

In the area of *acquisition,* two types of processing strategies have been confirmed: those that encourage controlling or directing one's attention, and those that optimize repetition processes.

Passing information from STM to LTM, through transformation, requires activating codification processes, in addition to processes of attention and repetition. "Elaboration" (superficial or deep) and more sophisticated "organizing or structuring" of information connect the latter with prior knowledge, becoming integrated into broader meaning structures that constitute what some refer to as cognitive structure, and others as knowledge base. The following have been recognized as information *codification strategies*: (a) mnemotechnics, in where the form is which knowledge is represented is predominantly perceptive, verbal and sometimes iconic, (b) elaborations of various types and, (c) organization of information.

The three groups of strategies (mnemotecnics, elaboration and organization) obtain deeper or less deep codifications, and as a consequence, give rise to deeper or less deep processing. Deep or complex codification strategies require more time and effort. Nonetheless, these as well as the others can get information to be stored long-term. The difference lies in that the deeper strategies assign greater "meaning" to the information.

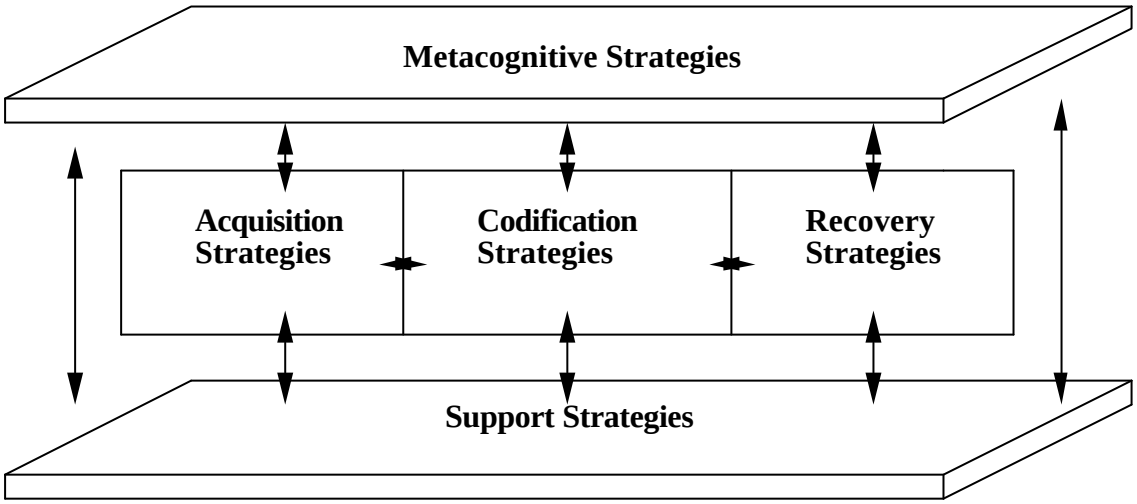
Recovery strategies encourage the search in LTM for information (meanings and other mental representations) and response generation (behavior); or, put differently, they serve to manipulate (optimize) cognitive recovery processes or recall through search systems, and later response generation. These strategies *transform meaning into behavior*.

During the time the information processing lasts, other non-cognitive processes activate or inhibit, are neutral or encumber the functioning of cognitive learning strategies. This is why the student also needs strategies and tactics that help him or her "handle" socio-affective support processes. *Support strategies* are directed at controlling non-cognitive resources that the student can manage in order to improve performance. Support strategies guarantee a suitable atmosphere for proper functioning of the cognitive system. Thus, in order to carry out information processing and recovery, their identification and correct management become necessary. Two types of support strategies are increasingly being recognized: social and affective (Rubio, 1991).

Likewise, during the time information processing lasts, processes of a metacognitive nature plan, evaluate and regulate or supervise the functioning of cognitive, social and affective strategies. Learning will be optimized or encumbered as a function of how these mental operations are applied. This is why students also needs strategies that help them to adminis-

ter knowledge processes and to manage the cognitive, affective and social processes themselves.

Figure 1: ACRA model of learning strategies (Román, 1990)



Metacognitive strategies involve, on one hand, knowledge that a person has about the processes themselves *(self-knowledge),* in general, and about cognitive learning strategies, in particular, as well as the ability to manage these *(self-management).* Chart I names the 32 strategies from the ACRA Model of learning strategies, with their corresponding items from the Scales (Román & Gallego, 1994).

If there are different ways to put a strategy into practice, then there will be different versions of the same effective sequence of mental operations: *learning tactics*. If a sequence of mental operations is executed time and again, then the *suppression* mechanism takes action (Secadas, 1996) and automation, compilation, capsulizing or packaging of skills is produced. A *cognitive automation* is being created; that is, we would be improving conceptualized intelligence as the set of strategies, abilities and cognitive automations which a person has at his or her disposal at a given moment for *solving problems* and *elaborating new products*.

Components of the "meaningful text-reading" strategy for university students

What learning skills should be taught for encouraging self-regulated learning, in keeping with analyses from the joint European community? How should they be sequenced in order to acquire, codify and recover information effectively? How should they be taught? etc.

From the area of "acquisition strategies" (Figure 1 and Chart I), we selected the *underlining skill*, as the first component of the strategy, because the content material which students will work with is well organized, though unfamiliar to them, and because it is the usual way of working. Elaboration of *paraphrase* is possible and even indispensable in meaningful reading of a text. It is equally possible and advisable to elaborate *self-questions* at the end. Paraphrasing and asking oneself questions are two study skills that have repeatedly demonstrated their effectiveness. The same is true of identifying the *text structure* in order to find the underlying logic behind the whole text. All of these belong to the area of elaboration strategies. *Conceptual maps*, as an integrating element of information previously analyzed (underlined) and elaborated (paraphrased and self-questions asked), were selected within the group of organization strategies (Scheel, 2004).

In the training procedure used, we promote *motivation* through "reports" about the effectiveness of mastering this strategy; such reports were given at the beginning of each training session by means of explaining the graphic content shown on a transparency. For obvious reasons we did not select any skill from the area of *social strategies*, although the social atmosphere of the classroom during training was treated with great care.

Chart I: Learning strategies identified by the ACRA Scales (correction key)

I-Scale of Information Acquisition Strategies

nº	Strategy	Items that operationally define it	Total
1	Exploration	1-3-11	(3)
2	Linear underlining	5-8	(2)
3	Idiosyncratic underlining	6-7-10	(3)
4	Labeling of passages	2-9	(2)
5	Reviewing aloud	13-14-16-19	(4)
6	Mental review	4-15-17-18	(4)
7	Reiterated review	12-20	(2)

II-Scale of Information Codification Strategies

nº	Strategy	Items that operationally define it	Total
8	Mnemotechnics	43-44-45-46	(4)
9	Intra-content relationships	3-4-5-29	(4)
10	Shared relationships	8-9-10	(3)
11	Images	11-12-13	(3)
12	Metaphors	14-15	(2)
13	Applications	6-7-16-17-18-19	(6)
14	Self-questions	21-22--23-27-28	(5)
15	Paraphrasing	20-24-25-26	(4)
16	Grouping	30-31-32-33-34-42	(6)
17	Sequences	35-36	(2)
18	Conceptual maps	38-39	(2)
19	Diagrams	1-2-37-40-41	(5)

III-Scale of Information Recovery Strategies

nº	Strategy	Items that operationally define it	Total
20	Search for codifications	1-2-3-4-10	(5)
21	Search for signs	5-6-7-8-9	(5)
22	Response planning	11-12-14-17-18	(5)
23	Written response	13-15-16	(3)

IV-Scale of Metacognitive Strategies

nº	Strategy	Items that operationally define it	Total
24	Self-knowledge	1-2-3-4-5-6-7	(7)
25	Self-management/Planning	10-11-12-13	(4)
26	Self-management/Regulation & evaluation	8-9-14-15-16-17	(6)

V-Scale of Support Strategies for Processing, or Socio-affective Strategies

nº	Strategy	Items that operationally define it	Total
27	Self-instructions	18-20-21-26-30	(5)
28	Self-control	19	(1)
29	Coping with distractions	22-23-24	(3)
30	Social interactions	25-27-28-29	(4)
31	Intrinsic-extrinsic motivation	31-32-33-34	(4)
32	Escape motivation	35	(1)

A brief teaching procedure which integrates the strategy into the curriculum.

Three dilemmas have been put forward with regard to teaching learning strategies at the university: (1) teaching content (declarative) or teaching strategies (procedural content); (2) teaching general or specific strategies; (3) teaching them as integrated into the curriculum or not.

As for the first dilemma, evidence indicates that *it is necesssary to teach content and strategies* (the latter is carried out by few university teachers). However, we know that differences between university students who have equal intellectual capacity but higher per-

formance than their peers are largely due to the use of more and better learning strategies. Abuse of content learning to the detriment of strategies most often leads to acquisition of "inert knowledge" (one has it but does not know how to use it) instead of acquiring "situated knowledge" (one has it and knows how to use it). For deep processing of content it is necessary to use strategies of elaboration and organization. And these can easily be taught integrated into the curriculum. Once learned, they can be maintained through random interventions throughout the length of the course. If the work is carried out by university teachers in the initial years of the degree program, it is enough for teachers in later years to offer random interventions for maintenance.

As for the second dilemma, it seems clear that both *general and specific strategies* are necessary according to the context and degree of knowledge of the discipline. However, only those strategies that seem useful should be taught, that is, that will most often be used in university studies, independently of the degree of generality or specificity. Students learn and apply strategies that the teachers teach deeply and later reinforce more or less randomly. It is preferable to master a few and deeply, than master many but superficially.

Regarding the last dilemma -- Should strategy teaching be done *integrated into the curriculum?* -- data are contradictory; there are advantages and disadvantages in both forms of implementation. But there are an increasing number who defend that both positions should be combined, as long as the teachers do maintenance interventions in the classroom.

When a student approaches the reading of a text, he or she constructs a representation of it; this representation is a product of two groups of factors: *prior knowledge* (linguistic, knowledge about the subject, about the world, about textual organization and about reading comprehension strategies) and *text characteristics,* especially its structure. For this reason, the objectives of this short, curriculum-integrated teaching job were: (1) Help "read meaningfully" both book chapters and journal articles as well as short monographs. (2) Acquire a "general strategy" of meaningful reading. The training can be done in a classroom in two or three class sessions. The proposed sequence of instructional activities for each training session (about 45 minutes) is summarized in Chart II.

The following instruments must be prepared for adequate implementation: (a) Monograph, chapter of book or journal article which the group is working on. (b) Educational psy-

chology information on transparencies, relating performance with the meaningful reading strategy to performance in subject matter, and with different individuals as subjects (in five-minute modules).

The researchers propose that motivation be "activated" with information about how to use the strategy, when and why it is useful; demonstrating in front of the students that it works; discussing with them why it is effective; giving published proofs that it works. The common steps or stages which different strategy training programs concur in are as follows: strategy description, description of application conditions, modeling, guided practice, independent practice, generalization and evaluation.

The problem of applying learned strategies in a more or less different context (*transfer* of learning) and the duration of training effects (*durability* of learning) beyond the first few days after the instruction process are still problems to be solved in the area of training procedures. In this study, the second phenomenon was approached in some sense, by carrying out a follow-up evaluation three months after completing the teaching.

Short-term training procedures are the usual in secondary education (e.g. García Madruga, 1997), but not at university. The structure of the selected procedure for carrying out curriculum-integrated teaching (incorporated), in university classrooms, entails the underlying structure of instructional activities that can be seen in Chart III.

Experimental objectives

(1) Experimentally validate the efficiency of an instruction procedure (brief and curriculum-integrated) in a "significant text-reading" strategy for university students.

(2) Confirm whether effects of training are carried over (transferred) to other relevant instructional variables which were not trained but are related to the strategy taught -- as is predicted by learning strategy models.

(3) Verify durability of the effects of training, both principal effects (reading strategy) and secondary effects (transfer to other relevant instructional variables).

(4) Identify variables that modulate the effects of training in meaningful reading strategies, those normally present in university classrooms and that can be useful to university teachers in order to better guide their daily teaching practice.

Method

Participants

Participants are six natural groups of students from the Faculty of Education at the University of Valladolid. The first two groups are from first year (35 students from Social Education and 55 from Early Childhood Education). The curriculum-integrated teaching of strategies was carried out in the "Developmental Psychology" course which a female teacher taught during 3 hours per week. The next two groups are from third year (47 students from Early Childhood Education and 24 from Speech and Hearing). The experiment was carried in their subjects of "Psychology of Family Education" and "Training in Cognitive Strategies", taught by a male teacher during three hours per week. The last two natural groups are fifth-year students (33 students from "Instructional Psychology" and 17 from "Programs for Teaching how to Think"), taught by the same male teacher. At each level we randomly decided which group would be trained (experimental group), and the non-trained group (control group) was informed and encouraged on a few occasions to work using learning strategies.

Instruments

In order to measure or manipulate each of the variables, the following instruments were utilized:

Strategy mastery (dependent variable-1) is the level of execution demonstrated on a given text. Execution refers to the five cognitive skills that in sequence constitute a text-reading strategy: linear underlining, paraphrasing, text structure, self-questions and conceptual map (Chart II). Norms were established for objectively scoring the *execution* present in expository texts. Two judges independently scored the protocols, discussed any disagreements, and a researcher randomly checked scores assigned by the judges. In order to measure the same strategy through *self-reporting*, we applied the *ACRA Scales* (Chart I).

Chart II: Recurring, interactive sequence of "instructional activities".

Motivation. For 5-10 minutes; only in the first work session, provide information about: (a) the micro- (45 minutes) and macro-sequence of work (3-4 sessions), (b) the importance of training of this nature.

1-Linear underlining. Read one paragraph and underline the phrase or phrases that each student considers most significant. Read the second paragraph and do the same. Proceed in this fashion until having reached the end of the passage.

2-Paraphrasing. Jot down an idea in the margin (at least one for every two or three paragraphs): synthesis, application, inference; relation to experiences; critique: limitations, errors, gaps, contradictions with one's beliefs, comparison to personal criteria, to something one has read, etc.

3-Underlying structure. Identify the "text structure" of the passage: problem-solution, cause-effect (or causality), description, comparison and sequence in time, etc. Make a note of it at the end.

4-Self-questions. In order to check whether you know what is most important in this passage, what three questions would you ask? In order to prepare the questions, use the Bloom taxonomy as a guide, or the types of paraphrasing, etc. Make a note of them at the end.

5-Conceptual map. Organize the map with at least three levels of concepts. Make a simple drawing at the end of each passage.

Objective Performance (dependent variable -2) means how much is learned of the conceptual content of an expository text with a text structure "sequence in time", with no help received in text processing, studied during fifteen minutes, and evaluated after five minutes of interferences analagous to real ones. Objective performance was quantified with three objective texts (pretest, postest, and follow-up), with "recognition" items (multiple choice) and with "recall" items.

Strategic Generalization (dependent variable -3), or generalizing effects from training in certain skills to other ones which are also optimized or facilitated by the same cognitive processes. By controlling this variable we seek to confirm whether the effects of training in a group of strategies is transferred to those of a similar nature, as is predicted by available theory, and as some studies have found (Voss, Wiley & Carretero, 1995). Strategic generationalization was operationalized with the same *Scales* but eliminating those 16 which were used as a "self-reporting" indicator of the skills directly trained.

Attitudes (dependent variable-4) are the positive, neutral or negative tendency toward the subject from within which the experiment was performed. Attitudes toward the subject were measured using an *Attitudes Scale,* SD type. It consists of 24 pairs of qualifying adjectives, action- and power-related, on a scale of 1 to 7.

Training procedure (independent variable) is the sequence of instructional activities--oriented and guided by constructivist psychological principles--that help to effectively acquire learning strategies (Chart III).

Chart III: "Underlying structure" of effective instructional activities.

1-Informing. Report on the strategy's effectiveness (why) and on the five skills that comprise the meaningful text-reading strategy (what). For stimulating intrinsically motivated behaviors.

2-Modeling. Using a photocopied text corresponding to the lesson plan, illustrate how to practice the five skills, thinking aloud (how). Procedural knowledge is learned better if the description is accompanied by operationalizing it.

3-Practicing. With a different photocopied text corresponding to the lesson plan, students implement the sequence of the five skills which were explained and exemplified. Intensive practice accelerates acquisition of procedures, and evenly distributed practice helps durability.

4-Feedback. Ask some students what they have done for each of the five skills and assess; ask about difficulties while carrying out their practice and assess. At the end of class, instruction is interrupted. The following day continue from the same step. Feedback on practice, as a process, increases satisfaction and efficacy because it makes possible an increasing degree of self-knowledge and self-management of cognitive skills themselves.

The independent variable has two conditions or values: trained group or control group, informed and encouraged on a few occasions to work using learning strategies. All scientific texts used in training were equivalent to the text structure "descriptive".

A series of covariables were also controlled: prior knowledge, linguistic intelligence, academic self-efficacy, approaches to learning and use of learning strategies.

Procedure

First step: Pretest: two class sessions per group; all questions, inventories and scales were applied in order to measure dependent variables and covariables. *Second step:* Training of the experimental class groups; three consecutive classes (one school week); the three class

groups, randomly selected, were trained simultaneously at the usual, established class days and times. Content areas were as follow: first-year students, "Affinity", third-year students "Elaboration strategies" fifth-year students "Current theories of intelligence" (students do *meaningful reading* of the photocopies from the textbook). *Third step:* Postest: two class sessions; "certain" questionnaires, inventories and scales were applied, but not all that were applied in the pretest. Those necessary for measuring the covariables were not applied. *Fourth step:* Follow-up: two class sessions; "certain" questionnaires, inventories and scales were applied.

Results

In Tables I, II, III and IV we present results (Román, 1997) that show that proceeding in this fashion in the classroom is effective. The "experiential" evidence communicated by some twenty university teachers who use the meaningful text-reading strategy points in the same direction as the subsequent experimental evidence.

Table I: Does the training procedure increase mastery of the strategy? (measured through execution)

Skills	*p*	*significant?*
First-year students		
Underlining	.99	No
Paraphrasing	.00001	Yes
Identifying text structure	.00001	Yes
Self-questions	.00001	Yes
Mapping	.001	Yes
Third-year students		
Underlining	.55	No
Paraphrasing	.009	Yes
Identifying text structure	.03	Yes
Self-questions	.00001	Yes
Mapping	.0001	Yes
Fifth-year students		
Underlining	.77	No
Paraphrasing	.0001	Yes
Identifying text structure	.02	Yes
Self-questions	.04	Yes
Mapping	.05	Yes

Table II: Does the training procedure increase mastery of the strategy? (measured by self-report)

Skills (self-report)	p	*significant?*
First-year students		
Underlining	.81	No
Paraphrasing	.85	No
Self-questions	.90	No
Mapping	.01	Yes
Third-year students		
Underlining	.002	Yes
Paraphrasing	.10	Tendency
Self-questions	.001	Yes
Mapping	.09	Tendency
Fifth-year students		
Underlining	.57	No
Paraphrasing	.02	Yes
Self-questions	.17	No
Mapping	.90	No

Table III: Is *transfer* of training effects produced? Dependent variables toward which there was transfer.

Transfer to...	*p*	*significant?*
First-year students		
Objective Performance	.01	Yes
Recognition	.004	Yes
Recall	.09	Tendency
Strategic Generalization	.76	No
Acquisition strategies	.23	No
Codification strategies	.74	No
Recovery strategies	.55	No
Attitudes	.08	Tendency
Third-year students		
Objective Performance	.0002	Yes
Recognition	.002	Yes
Recall	.007	Yes
Strategic Generalization	.003	Yes
Acquisition strategies	.004	Yes
Codification strategies	.01	Yes
Recovery strategies	.004	Yes
Attitudes	.73	No
Fifth-year students		
Objective Performance	.33	No
Recognition	.83	No
Recall	.05	Yes
Strategic Generalization	.85	No
Acquisition strategies	.86	No
Codification strategies	.95	No
Recovery strategies	.74	No
Attitudes	.09	Tendency

Table IV: Three months later, is there *durability* of training effects?

Dependent variables	*p*	*significant?*
Execution-Strategy	**.35**	**No**
Underlining	**.26**	**No**
Coincides	.30	No
Nearly coincides	.10	Tendency
Excessive	.07	Tendency
Insufficient	.66	No
Paraphrasing	**.10**	**Tendency**
Quantity	.66	No
Quality	.04	Yes
Identifying text structure	**.10**	**Tendency**
Self-questions	**.0007**	**Yes**
Quantity	.003	Yes
Quality	.0005	Yes
Form	.001	Yes
Mapping	**.008**	**Yes**
Objective Performance	**.53**	**No**
Recognition	.74	No
Recall	.22	No

Discussion and Conclusions

Will the teaching procedure--brief and curriculum-integrated--significantly increase mastery of the meaningful text-reading strategy?

In third-year students, the brief, curriculum-integrated teaching procedure *did* significantly increase the degree of mastery in four out of five skills that make up the strategy of meaningful text-reading, and in their components. In fifth-year students, the training procedure *was* effective in increasing mastery of the execution strategy, and shows a clear tendency to being effective with the same (self-report). Both quantity and quality of the paraphrases, quantity and quality of the self-questions, form and quality of the conceptual maps, all change significantly. All these components are the final explanation of changes produced through the meaningful reading strategy. And all of them are easily taught in university classrooms.

Is there transfer of the effects of training to instructional variables such as "objective performance", analogous "learning strategies" or "attitudes"?

The training *does* produce indirect, secondary or unplanned changes in the behavior of third-year students in the experimental group that are not observed in the control group. Available theory predicts this and evidence from this experiment corrobates it. In Experiment 1 we saw that transfer was carried to "objective performance" but not to "strategies used". The explanation might be found in that training of the third-year students was incorporated into a subject area more sensitive to this topic: "Training in Cognitive Strategies".

What about fifth-year students? This transfer of training effects to variables not directly trained, but related, is *not* observable. There *are* effects only on performance; these are noticeable if measured by *recall* tests, and we find this congruent with the depth of processing required by the strategy. Available theory predicts this and evidence has corroborated it. One explanation for the immediate non-transfer may be that, although they have learned to use some some of the skills comprising the strategy, this use is not yet *automated or "packaged"*, the state where best performance is being produced. Another explanation might be that the type of text student is not exactly the most suitable for reflecting the effects of strategy usage. A third explanation could lie in the type of test used: perhaps a test made up entirely of "recall" items would work better; this alternative could be backed up by the indication that the data tend to be significant.

As for “non-generalization” of the effects of training in certain learning skills to other skills that benefit from the same cognitive processes, this might be explained by the minimal *automation or packaging* that has been reached with the trained skills. Or also by the specific lack of instructional activities within the training which lead precisely to attaining such generalization; it may be insufficient if no indication in this sense is directed to the students.

What cognitive and affective variables of the student interact with the training procedure in the classroom instruction situation?

The procedure clearly interacts with recovery strategies and metacognitive strategies in order to increase mastery of the meaningful-reading strategy, with academic self-efficacy in order to increase objective performance, and with a superficial approach and a deep approach in order to increase strategic generalization. And it shows a “tendency” to interact, at least in the experimental evidence that we collected, with codification strategies, support strategies, a superficial approach and an achievement approach in order to increase mastery of

of the meaningful-reading strategy, sometimes measured by self-reports and other times by the execution. The training procedure clearly *interacts* with student variables of an affective nature (academic self-efficacy and deep approach to tasks) and with those of a cognitive nature (verbal intelligence, prior knowledge and metacognitive strategies) in order to increase mastery of one or another of the variables studied, at least in the experimental evidence that we we able to collect.

On the other hand, practically all variables interact with the training procedure to produce effects or a tendency in "objective performance", "strategic generalization" and "attitudes toward the subject". It is also notable that as the level of instruction to students is increased, the intrapersonal variables have more modulating power. That is, students self-regulate more and the teacher's influence is more mediatized.

Three months after training, do its principal effect and secondary effects remain (durability of effects)?.

As a whole there is some durability of training effects. It is greater if we take into account the effort invested in the training. With just three class sessions invested, results found for durability may be satisfactory. These results point in the same direction (accumulation) as other studies: "if no stimulation comes from the teacher (suggestion and encouragement) toward continued use of strategies taught, these become less and less utilized and are dropped completely in a short period of time" -- above all due to insufficient number of training sessions. Lacking these, for obvious reasons, it is a good idea for teachers to periodically remind students about the strategies. This simple stimulation makes strategy maintenance possible and therefore their automation in the long-term.

Suggestions for teacher intervention in the classroom

In the first month of the schoolyear, teach paraphrasing, self-questions, and elaboration of simple conceptual maps systematically, each teacher in his subject matter and in its specific type of texts or readings. During the rest of the schoolyear, encourage or remind students occasionally or randomly, so that they maintain strategy usage in their university assignments.

In earlier schoolterms it may be worthwhile to teach underlining, but this is not necessary for third- and fifth-year students. Do in-class modeling of learning skills from this study that are found to be teachable. That is, whenever there is an occasion, the teacher can do different types of paraphrasing, self-questions, conceptual maps on the blackboard, etc., using a class text and done explicitly in front of the students (thinking aloud).

The instructional procedure, or *effective sequence of instructional activities,* can easily be adapted to university classrooms, by substituting textbook photocopies with the corresponding article, monograph or manual, as the teacher sees fit. If working on a document takes up more than one class period, it is not a detriment: continue working where one left off in the previous class, the same way that one does when developing one's classes through "meaningful expository teaching".

References

García Madruga, J.A. (1997). Comprensión y aprendizaje a partir de textos: aspectos teórico-prácticos y experimentales. [Comprehension and learning from texts: theoretical-practical and experimental aspects.] In J.N. García (Comp.), *Instrucción, aprendizaje y dificultades* (pp. 171-188). Barcelona: Ediciones LU.

Muñoz, J. (2003). *Estrategias de enseñanza metacognitivas a niños de preescolar*. [Metacognitive teaching strategies for preschool children.] Universidad de Burgos: Doctoral Thesis.

Pramling, I. (1990). *Learning to Learn: A Study of Swedish Preschool Children.* New York: Springer-Verlag.

Rigney, J.W. (1985): Learning Skills: A Theoretical Approach. In F. Segal, Chipman & Glaser (Eds): *Thinking and Learning Skills: (1) Relating Instruction to Research* (pp. 27-59). Hillsdale, NJ: LEA.

Román, J.M. (1990). Procedimientos de entrenamiento en estrategias de aprendizaje. [Training procedures for learning strategies.] In J.M. Román & D.A. García (Comp.), *Intervención clínica y educativa en el ámbito escolar* (pp. 95-118). Valencia: Editorial Promolibro.

Román, J.M. (1993). Entrenamiento en estrategias de aprendizaje: secuencias, principios y validación. [Training in learning strategies: sequences, principles and validation.] In

C. Monereo (Ed.), *Las estrategias de aprendizaje: Procesos, Contenidos e Interacción* (pp. 169-191). Barcelona: Doménech Edicions.

Román, J.M. (1994). Procesos cognitivos y estrategias de aprendizaje en superdotados. [Cognitive processes and learning strategies in gifted students.] In Y. Benito (Comp.), *Intervención e investigación psicopedagógica en alumnos superdotados* (pp. 233-259). Salamanca: Amarú Ediciones.

Román, J.M. (1997). *Estrategia de lectura significativa de textos y rendimiento en universitarios.* [Meaning text-reading strategy and performance in university students.] Universidad de Valladolid: Departamento de Psicología. Research report (135 págs.).

Román, J.M. & Gallego, S. (1994). *ACRA: Escalas de Estrategias de Aprendizaje.* [ACRA: Learning Strategy Scales.] Madrid: TEA Ediciones (7th edition, February 2002).

Rubio, E. (1991): *Habilidades sociales y estrategias de aprendizaje en universitarios.* [Social skills and learning strategies in university students.] Universidad de Barcelona: Doctoral Thesis.

Scheel, G. (2004). *Mapas conceptuales y aprendizaje significativo en estudiantes universitarios.* [Conceptual maps and significant learning in university students.] Universidad de Valladolid: Doctoral thesis.

Secadas, F. (1996). Teoría del desarrollo por acumulación de habilidades. [The theory of development by skill accumulation.] In J.M. Román, S. Sánchez & F. Secadas, *Desarrollo de habilidades en niños pequeños* (pp. 21-52). Madrid: Pirámide (5th edition, 2003).

Voss, J.F., Wiley, J. & Carretero, M. (1995). Learning skills: general vs. specific. *Annual Review of Psychology, 46,* 155-181.

[This page is intentionally left blank]