Enhancing vocabulary development and reading comprehension through metacognitive strategies

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This article presents a study of the teacher trainees in an English department who have received instruction in metacognitive awareness for reading comprehension. Metacognition or 'thinking about thinking' involves the awareness and regulation of thinking processes. Metacognitive strategies are those strategies which require students to think about their own thinking as they engage in academic tasks. Within this study, students have been taught metacognitive strategies for reading in a five week program they have joined voluntarily. The students have used reading logs to reflect on their own thinking processes as they have been engaged in reading tasks. The purpose of the study is to determine the effectiveness of systematic direct instruction of multiple metacognitive strategies designed to assist students in comprehending text. Specifically, the reading comprehension and vocabulary achievement of 130 third year university students has been investigated to determine whether instruction incorporating metacognitive strategies has led to an increase in the reading comprehension of expository texts. In addition, the investigation is also designed to determine the impact of the metacognitive strategies on vocabulary.

Metacognition

One of the first definitions of metacognition comes from Flavell (1976), who describes it as one's knowledge concerning one's own cognitive processes and products or anything related to them. Flavell also asserts that metacognition includes the active monitoring and consequent regulation and orchestration of information processing activities (Flavell, 1976, p.232). Baird (1990, p.184) uses these ideas to provide the following succinct formulation, "Metacognition refers to the knowledge, awareness and control of one's own learning". Metacognitive development can therefore be described as a development in one's metacognitive abilities, ie, the move to greater knowledge, awareness and control of one's learning.

Scholars do not agree on the exact definition of metacognition. On one hand, some researchers (Flavell, 1979; Veenman, 1993; O'Neil and Abedi, 1996; Kuhn, 2000) claim that metacognition has two components, firstly, the students' self awareness of a knowledge base in which information is stored about how, when, and where to use various cognitive strategies and secondly, their self awareness of and access to strategies that direct learning (eg, monitoring difficulty level, a feeling of knowing). This awareness is developmental and lies on a continuum. Proficient readers use one or more metacognitive strategies to comprehend texts.

On the other hand, for Pintrich, Wolters and Baxter (2000), there are three main components of metacognition, metacognitive knowledge, metacognitive monitoring, self

regulation and control). The first, metacognitive knowledge, consists of cognitive learning strategies which the learner uses to regulate the process of knowledge acquisition. These include, for example, elaboration strategies such as the building of links to prior knowledge, or memory strategies such as note taking. The second group, metacognitive monitoring, consists of metacognitive control strategies. Central here are activities like the planning and monitoring of learning activities, the evaluation of learning outcomes and the adaptation to varying task demands and (unexpected) difficulties, for example, an increase in directed efforts.

In addition to these two groups, which are dominant in research and crucial for the learning process, a third group of strategies in the model developed by Pintrich and Garcia (1994) is dedicated to resource management and self management. These strategies are concerned with the control of the general conditions associated with learning, for example, time management and management of the learning environment.

Pintrich's model suggests that the learner develops perceptions of the task demands, engages in metacognitive monitoring, selects and implements cognitive strategies that are appropriate for the task demands, and evaluates task performance while reflecting on the effectiveness of the cognitive strategies.

In terms of metacognitive awareness and knowledge and to help students become aware of metacognitive strategies, the first step for students is to ask themselves the following two key questions.

1. What do I want out of this? (What are my motives?)
2. How do I propose going about getting there? (What are my strategies?) (Biggs & Moore, 1993)

Another important metacognitive model set forth by Winne and Hadwin (1998) has four basic stages, task definition, goal setting and planning, enactment, and adaptation. Their model suggests that the learner generates a perception of what the task is and the available resources, constructs a plan for addressing the task, enacts study strategies, and makes changes to his or her cognitive structure based on perceptions of performance.

Pintrich (2000) synthesised the work of a variety of self regulation theorists into a general framework which included

a. forethought, planning and activation
b. monitoring
c. control
d. reaction and reflection.

These models all suggest an interaction between personal factors and situational factors such as task and test demands, the use of cognitive learning strategies, and self reflection.

Reading and metacognition

The current understanding of reading strategies has been shaped significantly by research on what expert readers do (Bazerman, 1985; Pressley & Afflerbach, 1995). These studies demonstrate that successful comprehension does not occur automatically. Rather, successful comprehension depends on directed cognitive effort, referred to as metacognitive processing, which consists of knowledge about and regulation of cognitive processing. During reading, metacognitive processing is expressed through strategies, which are "procedural, purposeful, effortful, willful, essential, and facilitative in nature" and "the reader must purposefully or intentionally or willfully invoke strategies" (Alexander & Jetton, 2000, p.295), and does so to regulate and enhance learning from text. Through metacognitive strategies, a reader allocates significant attention to controlling, monitoring, and evaluating the reading process (Pressley, 2000; Pressley, Brown, El-Dinary, & Afflerbach, 1995).

Taraban, Kerr, and Rynearson, (2004, p.69) state that prior research supports the view that college students select and use reading strategies that are oriented toward success in academic tasks. Wade, Trathen, and Schraw (1990) recruited 67 college volunteers who read a 15-page passage at the 11th-grade level followed by a recall test. This type of task, involving extensive reading and subsequent recall, is typical of many college assignments (Susser & Robb, 1990). At eight separate points during reading, participants were asked to provide a retrospective report of their reading strategies. The authors identified 14 strategies from the data, which they called 'tactics'. These were separated into three types, by consensus of all these three researchers. One type consisted of text noting tactics, and included highlighting, underlining, circling, copying key words, phrases or sentences, paraphrasing in notes, outlining and diagramming. The second type consisted of mental learning tactics and included rote learning of specific information, mental integration, relating information to background knowledge, imaging, visualizing, self questioning and self testing. The third type consisted of reading tactics, which included reading only, skimming, reading slowly, and re-reading selected text. These data reveal that reading strategies are directed toward comprehension, but also toward studying and remembering.

Poor readers are less aware of effective strategies and of the counterproductive effects of poor strategies, and are less effective in their monitoring activities during reading. Brown and Palincsar (1985) suggested that an effective reading instruction program should require the identification of complementary strategies that are modeled by an expert and acquired by the learner in a context reinforcing the usefulness of such strategies. Adult and college readers who show evidence of metacognitive deficiencies may be considered as unaware and incapable of monitoring their mental processes while reading. Unskilled reading comprehension is one aspect to show the importance and need for training (Cohen, 1986). Unskilled readers can become skilled readers and learners of whole text if they are given instruction in effective strategies and taught to monitor and check their comprehension while reading. With respect to this point, Al Melhi (2000) has found that some differences do exist between skilled and less skilled readers in terms of their actual and reported reading strategies, their use of global reading strategies (such as underlining,

guessing, reading twice and etc), their metacognitive awareness, their perception of a good reader, and their self-confidence as readers. Training in metacognitive language learning strategies help learners develop their reading skills and raise their language proficiency levels (Palincsar, 1986; Green & Oxford, 1995; Carrell, Gajdusek & Wise; 1998).

Purpose of study

Skilled readers use rapid decoding, large vocabulary, phonemic awareness, knowledge about text features, and a variety of strategies to aid comprehension and memory. Good readers are selectively attentive. They sometimes make notes. They predict, paraphrase, and back up when confused. They try to make inferences to fill in the gaps in text and in their understanding of what they have read. Good readers intentionally attempt to integrate across the text. They do not settle for literal meanings but rather interpret what they have read, sometimes constructing images, other times identifying categories of information in text, and on still other occasions engaging in arguments with themselves about what a reading might mean. (Pressley & Afflerbach, 1995). Unskilled readers, by contrast, often focus on decoding single words, fail to adjust their reading for different texts or purposes, and cannot make use of the strategies adequately (Carrell, 1989; 1992). Hence, the researcher wishes to probe the question of metacognitive strategy training in reading. The purpose of the present study is to examine how strategy instruction affects Turkish students' reading comprehension and vocabulary development in English. In doing so, it attempts to investigate whether the results obtained will confirm the findings of previous studies conducted in langauge learning settings.

Methodology

Participants

Participants were third year teacher trainees in the English language department in Dokuz Eylul University. 130 students (15 males and 115 females) joined the study voluntarily and 65 students took metacognitive instruction for five weeks. The other 65 students did not take any training at all.

Design

This study had an intact group, pre-test post-test, experimental design. The subjects were already assigned in groups by the institution. Two classes were selected for this study and one was randomly assigned as experimental and the other as the control group. The homogeneity of the two groups in terms of vocabulary knowledge and reading comprehension was checked using a vocabulary achievement test and the comprehension test respectively.

Instrumentation

Two instruments were used in this study. The first one was a 20 item multiple-choice test of vocabulary, which was developed by the researcher. The vocabulary items in the test

were mainly selected from the new lexical items taught and given exposure during the course. The test was used as the assessment tool in the pre-test and the post-test phase of the study. Two internal consistency estimates of reliability which included coefficient alpha and a split half coefficient expressed as Spearman-Brown corrected correlation were computed for the vocabulary test. For the split half coefficient, the test items were split into two halves based on odd and even numbers to nullify the effects of unwanted factors such as tiredness of the test takers. The value for coefficient alpha was .85 and the value of the split half coefficient was .90, each indicating satisfactory reliability.

The second test was the reading comprehension test developed by TOEFL (Test of English as a Foreign Language) (http://www.newtoefl.net/reading.html). It was used in the pre-test and post-test stage of the study. The value for coefficient alpha was .78.

Metacognitive strategy ınstruction

The students in the experimental group received 45 minutes of reading comprehension instruction a week for 5 weeks.

The passages were taken from the reading comprehension book *Expanding Reading Skills* (Markstein & Hirasawa, 1993). In each class hour they were taught two metacognitive strategies and they applied them to the passages. The strategies which were taught were as follows.

- *Using strengths*: While reading, I exploit my personal strengths in order to better understand the text. If I am a good reader, I focus on the text; if I am good at figures and diagrams, I focus on that information.
- *Inferring meaning* (through word analysis or other strategies): While I am reading, I try to determine the meaning of unknown words that seem critical to the meaning of the text.
- *Using background information*: While I am reading, I reconsider and revise my background knowledge about the topic, based on the text's content.
- *Evaluating*: As I am reading, I evaluate the text to determine whether it contributes to my knowledge/understanding of the subject.
- *Searching according to the goals*: I search out information relevant to my reading goals.
- *Reading goals*: I evaluate whether what I am reading is relevant to my reading goals.
- *Distinguishing*: As I am reading, I distinguish between information that I already know and new information.
- *Deciding on the difficulty*: I note how hard or easy a text is to read.
- *Revising*: While I am reading, I reconsider and revise my prior questions about the topic, based on the text's content.
- *Guessing the later topics*: I anticipate information that will be presented later in the text.

Table 1 outlines the weekly activity for each group. Both groups received the usual training based on the procedures suggested in the *Expanding Reading Skills*. Both groups

Table 1: Timetable for the groups

Weeks	Control group	Experimental group
1	Unit 1 and its exercises in the book	Unit 1 and two metacognitive strategies (using strengths and inferring meaning)
2	Unit 2 and its exercises in the book	Unit 2 and two metacognitive strategies (background information and evaluating)
3	Unit 3 and its exercises in the book	Unit 3 and two metacognitive strategies (searching and reading according to the goals)
4	Unit 4 and its exercises in the book	Unit 4 and two metacognitive strategies (distinguishing the new info and deciding on the difficulty)
5	Unit 5 and its exercises in the book	Unit 5 and two metacognitive strategies (revising and guessing)

were taught by the same person. It is believed that metacognitive strategies are responsible for controlling other strategies and as a result they have their best effects if students are aware of other strategies that are available to them at the beginning of the course (O'Malley & Chamot, 1990). The experimental group received explicit instruction on metacognitive strategies beginning from the first day of the course. Chamot & O'Malley's (1994) Cognitive Academic Language Learning Approach (CALLA) was chosen to apply in the strategy training. The sequence of instruction in the CALLA approach is a five phase recursive cycle for introducing, teaching, practicing, evaluating, and applying learning strategies. In this approach, highly explicit instruction in applying strategies to learning tasks is gradually faded so that students can begin to assume greater responsibility in selecting and applying appropriate learning strategies by following the five steps of the training model.

1. *Preparation:* The purpose of this phase was to help students identify the strategies they are already using and to develop their metacognitive awareness of the relationship between their own mental processes and effective learning. In this step the teacher explained the importance of metacognitive learning strategies. In relation to reading comprehension, which was the subject of this study, students with the help and guidance of the teacher, set specific goals for mastering certain chapters in the textbook within a certain time frame, and they planned their time in order to accomplish the task

2. *Presentation:* This phase was related to modeling the learning strategy. The teacher talked about the characteristics, usefulness, and applications of the strategy explicitly and through examples. The teacher also illustrated her own strategy use through a reading task in relation to unknown vocabularies. Learners were explicitly taught about the variety of strategies to use (two at a time). They received explicit instruction on how to use these strategies. They were told that no single vocabulary learning strategy would work in every case. For example, word analysis strategy (dividing the word into its component morphemes) may work with some words but not with others. Using contextual cues for guessing the meaning of unknown words may be effective in some rich-context cases but not in context-reduced texts. The preparation and planning, the

selection of vocabulary learning strategies, monitoring of strategy selection and use, orchestrated use of several strategies, and evaluation of effectiveness of metacognitive strategies for vocabulary learning were illustrated through several examples.

3. *Practice:* In this phase, students had the opportunity of practising the learning strategies with an authentic learning task. They were asked to make a conscious effort using the metacognitive strategies in combination with vocabulary and reading. The students, with the teacher's assistance, practised monitoring while using multiple strategies available to them. The students became aware of multiple strategies available to them by learning, for example, how to use both word analysis and contextual clues to determine the meaning of an unfamiliar word. Students were shown how to recognise when one strategy wasn't working and how to move on to another. The students needed to be able to turn to other strategies such as using contextual clues, to help them understand the meaning of the word.

4. *Evaluation:* The main purpose of this phase was to provide students with opportunities to evaluate their own success in using learning strategies, thus developing their metacognitive awareness of their own learning processes. Activities used to develop students' self-evaluation insights, included self questioning, debriefing discussions after strategies practice, learning logs in which students recorded the results of their learning strategies applications, checklists of strategies used, and open ended questionnaires in which students expressed their opinions about the usefulness of particular strategies.

5. *Expansion:* In this final phase students were encouraged to a) use the strategies that they found most effective, b) apply these strategies to new contexts, and c) devise their own individual combinations and interpretations of metacognitive learning strategies.

At the end of the course both the control group and the experimental group were given the vocabulary and reading comprehension tests and the results of the tests were compared to find the effects of the training.

Results

In order to show the efficacy of the intervention, students' pre- and post-test scores on a criterion referenced vocabulary test and a standardised reading comprehension test were analysed to see if there was a statistically significant difference between the two groups. Means and standard deviations for pre- and post-test academic scores can be found in Tables 2 and 3.

Tables 2 and 3 show that the mean for Vocabulary of the experimental group in the post-test (41.22) is higher than that of the control group (37.07). The mean for Reading comprehension of the experimental group in the post-test (121.71) is higher than that of the control group (118.86).

Table 2: Means and standard deviations for vocabulary test

	Control group (65 students)		Experimental group (65 students)	
	Mean	Std. Deviation	Mean	Std. Deviation
Pretest	34.47	4.69	34.17	4.57
Posttest	37.07	4.67	41.22	4.25

Table 3: Means and standard deviations for reading comprehension test

	Control group (65 students)		Experimental group (65 students)	
	Mean	Std. Deviation	Mean	Std. Deviation
Pretest	116.32	11.43	117.41	14.21
Posttest	118. 86	13.11	121.71	13.16

In order to show that the difference between these two groups is due to these five weeks of training and not due to chance effects, analysis of covariance ANCOVA was conducted. The results are shown in Table 4.

Table 4: Tests of between-subjects effects

Source	Sum of squares	df	Mean square	F	Sig
Vocabulary	36.64	1	39.15	3.95	0.003
Reading	120.23	1	120.23	3.62	0.003
Error	84.200	28	3.12		
Total	723.000	30			

The value of 0.003 indicates that there is strong evidence of a difference between control and experimental groups regarding vocabulary and reading comprehension tests. The strategy training process can be said to be effective even though it lasted only for five weeks.

Discussion

These results may indicate that the impact of the metacognitive strategy training is important in developing vocabulary and bettering reading comprehension skills. This result has implications for learners, teachers, and teacher educators in the realm of language learning in particular and education in general and helps teachers in accomplishing their challenging task of teaching English. Teachers can help learners use different metacognitive strategies to facilitate their vocabulary learning. This study provides further evidence of the benefits of metacognitive strategy training. All the students in both control and treatment groups have gained some metacognitive awareness which can help them understand what they read. The experimental group achieved

significantly better results than the control group. The results of the present study have confirmed that reading comprehension could be developed through systematic instruction in metacognitive language learning strategies. Systematic explicit instruction about the concept of metacognition and learning strategies helped students of the experimental group to better comprehend this new approach and how to apply it to different learning tasks on reading. The model of instruction provided for teaching and applying each one of the ten metacognitive language learning strategies included in the suggested training program helped the students to know why, when, and how to use the strategies as most students clearly point out in their reading logs. They stated that being aware of which strategy should be used where and when helped them achieve higher grades in the tests, and they maintained that five weeks of instruction led them to be aware of metacognitive strategy use. The post-test results show that the students in the experimental group started to think metacognitively about the strategies they could use to improve their reading comprehension to become not only better readers, but also autonomous and strategic learners (Alexander & Jeton, 2000).

Limitations of the study

Though the results are based on two reading classes of sophomore students at a large western state university, they need to be treated with caution. If the groups are tested again in two terms, the results might be different and this needs to be searched. Although it can be claimed that the investigation has certainly added to the understanding of the role of the metacognitive strategy training and the achievement of the students in vocabulary and reading comprehension, what we need to remember is that skilled readers don't achieve which strategy to use and when, where, why to employ a particular strategy over night. They learn how to do this complex reading by doing it repeatedly, over long periods of time, with lots of different texts, and with lots of opportunities to practice applying strategies, and monitoring their processes and evaluating the effectiveness of different strategies for themselves in different reading situations. Therefore, metacognitive reading strategy teaching should also be a long term educational process, with constant attention and support over longer periods of time. With teachers explaining and modeling use of a wide variety of strategies, scaffolding student practice and application, providing re-explanations and additional modeling as necessary and helping learners to experience reading strategies as personal cognitive and metacognitive tools for making meaning, reading strategy use should be seen not as means to pursue a 'correct' in text meaning, but as long term means to personal understanding and interpretation of text that is, nonetheless, based on the text (Carell, 1992; Raymond, 1993; Pressley & Afflerbach, 1995; Song, 1998).

Acknowledgement

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