Metacognitive strategy instruction in L2 reading

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Abstract

Recent research in L2 language education has begun to recognize that metacognition plays a significant role in L2 learning processes. These studies have investigated metacognitive awareness of learning strategies and the relationships among perceived strategy use, actual strategy use, and L2 performance. This paper reports a classroom-based, longitudinal study of the effect of metacognitive strategy instruction on reading comprehension.

To achieve the purpose of the study, two groups of EFL university students were assigned to an experimental and a control group. Both groups received instruction on reading strategies through a ten-week period. However, only the experimental group received metacognitive strategy training during this period. The results showed that: (1) explicit metacognitive strategy training has a significant positive effect on reading comprehension; (2) although all subjects in the experimental group showed considerable gains, lower-ability subjects seemed to benefit the most from strategy training.

Strategy training research so far has seemed to focus on the cognitive aspects of language learning processes. Relatively little research on metacognitive strategy training has been done in an L2 context. However, this study showed a potential role of metacognition in effective L2 learning. If students could reflect upon their learning processes properly, they would
become better prepared to make conscious decisions about what they can do to improve their learning.

1. Introduction

The concept of metacognition has recently become a popular area in educational psychology (e.g., Hacker, Dunlosky, & Graesser, 1998; Hartman, 2001). Within the research context of second or foreign language (henceforth abbreviated only to L2) education, recent research has focused on metacognition (e.g., Carrell, Gajdusek, & Wise, 2001; Carrell, Pharis, & Liberto, 1989; Wenden, 1998, 1999).

Researchers are deeply concerned about the type and levels of knowledge that students are acquiring in schools. For example, Paris and his colleagues developed two programs: Informed Strategies for Learning and Reading, and Thinking Strategies for students in Grades 3 through 8 (e.g., Paris, Byrnes, & Paris, 2001). One of the goals of the programs is to foster the use of declarative (propositional), procedural ("how to") and conditional ("knowing when and why") metacognitive knowledge so that students make better decisions about the strategies to use in different situations.

Passive transmission such as reception of information and memorization of facts is not the kind of learning that will be required for success in the future. Students who, for example, engage in a particular language task will be expected to think critically about what they hear and read, identify relationships between various ideas, make difficult decisions, and monitor their own thought processes. Studies explicitly show that metacognitive knowledge and skills play an important role in effective learning and greatly assist in academic success (Zimmerman & Martinez-Pons, 1990).

If this is the case, less successful students may improve their skills through training in strategies evidenced by more successful students. Although attempts to teach L2 students to use language learning strategies
have tended to produce good results (e.g., Thompson & Rubin, 1993), not all L2 strategy training studies have been successful or conclusive, and have produced mixed results. In addition, few studies have systematically assessed the effectiveness of such training in L2 classrooms. Therefore, this paper reports on a classroom-based longitudinal experiment that examined the effect of metacognitive strategy instruction on students' improvement in L2 reading performance.

2. Research on reading strategies

Studies of the reading strategies of successful/less successful language learners have identified a number of cognitive and metacognitive strategies that L2 learners use (e.g., Block, 1986; Carrell, 1985; Hosenfeld, 1977; Knight, Padron, & Waxman, 1985). Cognitive strategies are behaviors, techniques, or actions used by learners to facilitate acquisition of knowledge or a skill (Rubin, 1987). These strategies operate directly on incoming information, manipulating it in ways that enhance learning. Metacognitive strategies are management techniques by which learners control their learning process via planning, monitoring, and evaluating their learning process (Rubin, 1990; Thompson & Rubin, 1996). These strategies are said to be applicable to a variety of learning tasks (e.g., Wenden, 1998, 1999).

The list of cognitive strategies used in reading includes skimming a text to get the general idea, scanning a text for a specific piece of information, skipping unknown words, making predictions, identifying the main idea, and so forth. On the other hand, metacognitive strategies used by successful language learners include setting a purpose, arranging the appropriate conditions for reading, and checking one's understanding, to name a few.

Although much of the research in the area of reading strategies has stemmed from first language (L1) studies in reading, the brief review that follows only includes the major research in L2 learning. Hosenfeld (1977) used a think-aloud procedure to identify relations between certain types of reading
strategies and successful/less successful L2 reading. The successful reader, for example, kept the meaning of the passage in mind while reading, read in broad phrases, skipped inconsequential or less important words, and had a positive self-concept as a reader. The less successful reader, on the other hand, lost the meaning of the sentences when decoded, read in short phrases, pondered over inconsequential words, seldom skipped words as unimportant, and had a negative self-concept.

Block (1986) also used a think-aloud procedure in her study of non-proficient readers based on native and non-native English speakers enrolled in freshman reading courses in the U.S. She was able to obtain information about four characteristics that seemed to differentiate successful from less successful readers, namely: (1) integration, (2) recognition of aspects of text structure, (3) use of general knowledge, personal experiences, and associations, and (4) response in an extensive versus a reflective mode. In the reflective mode, readers direct their attention to themselves and focus on their own thoughts and feelings rather than on the information in the text. In the extensive mode, the reader's focus is on understanding the idea of the author, not on relating the text to themselves.

Knight, Padron, and Waxman (1985) conducted a study to determine whether there are differences in either the type or frequency of cognitive reading strategies reported by ESL and monolingual students. Individual interviews, which were audio taped for analysis, were conducted with 23 Spanish-speaking ESL students and 15 English monolingual students. The study found that English monolinguals used the strategy of concentrating the most, while the strategy of students’ perceptions of teachers’ expectations was least cited. ESL students, on the other hand, cited this latter strategy the most. The categories of imaging, noting/searching for salient details and predicting outcomes were not cited by any bilingual students during the interviews. The results also indicated that, overall, English monolingual students were using about twice as many strategies as Spanish-speaking ESL
students. One explanation that the authors offered for these results was that ESL students may not have had enough time to develop these strategies in their first language and were transferred to English texts too quickly.

There have been several other studies that have shown the relationships between various reading strategies and successful L2 reading. However, the picture is not as simple as this might suggest because use of certain reading strategies does not always lead to successful reading comprehension, while failure to use these strategies or use of other strategies does not always result in unsuccessful reading comprehension (Carrell, 1998). For example, Anderson (1991) carried out a study to investigate the individual differences in strategy use by adult L2 learners while engaged in two reading tasks. Analysis of both quantitative and qualitative data revealed that there was no single set of processing strategies that significantly contributed to success in the reading measures. Both high and low scoring readers appeared to be using the same kinds of strategy while answering the comprehension questions on both measures; however, high scoring students seemed to be applying strategies more effectively and appropriately.

More recently, Yamamori, Isoda, Hiromori, and Oxford (2003) investigated transitions over time in the learning strategies used by Japanese seventh-grade EFL students in relation to the will to learn and English achievement. Based on patterns of change, 81 students were categorized by means of statistical cluster analysis, yielding four clusters (groups) with distinct characteristics. Two high-achieving groups were found to have mutually differential patterns of strategy use. Also, two low-achieving groups had distinctive patterns of strategy use. These results support the observation above that the relationship between strategy use and achievement is complex, multifactorial, and often nonlinear, implying that more than one route exists to success in learning a foreign language.

Research reported by these two studies clearly shows that there are no simple one-to-one relationships between particular strategies and
successful performance. As far as reading comprehension is concerned, strategic reading is not only a matter of knowing which strategies to use, but in addition, the reader must know how to apply strategies appropriately. Understanding and controlling reading processes should be an essential skill that differentiates successful from less successful students. Then, how can successful students manage to do this, and what is more, how can we, as teachers, teach these skills to less successful students? The author thinks this is where metacognition comes in.

3. Metacognitive strategy instruction in L2 reading

In general, metacognition can be considered simply as thinking about thinking. However, what does that mean exactly? Flavell (1979) describes metacognition as awareness of how one learns; awareness of when one does and does not understand; knowledge of how to use available information to achieve a goal; ability to judge the cognitive demands of a particular task; knowledge of what strategies to use for what purposes; and assessment of one’s progress both during and after performance. Whereas cognitive strategies enable one to make progress (e.g., building knowledge), metacognitive strategies enable one to monitor and evaluate one’s progress. Thus, metacognition is vital to cognitive effectiveness.

Many researchers seem to agree that the component of metacognition can be divided into two parts: knowledge of cognition and regulation of cognition (e.g., Brown, 1987; Hartman, 2001). Knowledge of cognition refers to what individuals know about their own cognition or about cognition in general. It includes at least three different kinds of metacognitive awareness: declarative, procedural, and conditional knowledge (Brown, 1987). Declarative knowledge refers to knowing “about” things. Procedural knowledge refers to knowing “how” to do things. Conditional knowledge refers to knowing the “why” and “when” aspects of cognition. Regulation of cognition, on the other hand, refers to a set of activities that help students control their
learning. Essential skills include planning, monitoring, problem-solving, and evaluating.

In the context of L2 research, several studies focusing on reading strategy instruction have been conducted (e.g., Hamp-Lyons, 1985; Ikeda & Takeuchi, 2003; Kern, 1989; among others). Kern (1989), for example, investigated the effects of reading strategy instruction on reading comprehension of university students enrolled in a third-semester French course. The experimental group received explicit strategy training in reading that was integrated into the normal course curriculum. The results indicated that reading strategy instruction had a strong positive effect on L2 comprehension gain scores, showing that strategy training can be effective in helping L2 learners improve reading comprehension.

Although these studies have tended to produce favorable results, most of the strategy instruction research so far have focused on cognitive strategies as one of the main categories of learning strategy (but see Carrell’s series of research for some exceptions: e.g., Carrell, 1985, 1998). However, due to the importance of metacognitive strategies, the present study focuses on explicit metacognitive strategy instruction as well as cognitive strategy instruction, and investigates the impacts on the improvement of student’s reading comprehension. In addition, only a few studies (e.g., Ikeda & Takeuchi, 2003) have examined the influence of learners’ language proficiency on the effects of strategy instruction. Therefore, this study also investigates this issue.

To achieve the purpose of the study, the following research questions were proposed: (1) Does systematic instruction in the use of metacognitive as well as cognitive strategies significantly improve student’s reading comprehension? (2) Is the effect on reading comprehension similar for all students, or is there a differential effect on students of various reading ability levels? To answer these questions, the author designed and carried out a classroom-based longitudinal study. The study focused on the effect of both
metacognitive and cognitive strategy instruction on student’s reading comprehension performance in English.

4. Method
4.1 Subjects

60 students enrolled in a required first-year English language course participated in the study. In this course, students read and discussed various topics (e.g., science, language, business, and education), refined their writing skills, and reviewed important grammar.

Two treatment groups were established: (1) an experimental group (N = 30) that received explicit instruction in reading strategy use in addition to the normal course content; and (2) a control group (N = 30) that received no such explicit instruction in reading strategies, but that otherwise covered the same material. Both groups met once a week in a 90-minute class, used the same course materials, and followed the same syllabus.

4.2 Treatments

Self-regulated strategy training in L2 reading was the treatment given to the experimental group for ten weeks in 2004. During the first class, students were told that we were looking for ways to improve their reading comprehension in English, and they were encouraged to be aware of the purpose and procedures of the strategy practice that they would be involved in. The practice materials were composed of a series of cognitive reading strategies (e.g., pre-reading preparation, skimming, scanning, finding topic sentences) as well as metacognitive strategies (e.g., planning, monitoring, evaluation) (for a sample material, see Appendix). As for the development of the materials, the following L2 textbooks were referred to: Developing reading strategies by S. K. Kitao and K. Kitao (1994) and Read up: 22 steps to strategic reading by T. Tsuchiya, R. Hanamitsu, and B. Benfield (2002).

At the beginning of each class, the students were encouraged to
share their prior knowledge about the target reading strategy and discussed their rationale for strategy use in reading. The strategy practice materials were given to the students as weekly homework that they had to complete and practice independently outside the class and hand in at the next class.

4.3 Measures of reading comprehension

Prior to the beginning of reading strategy instruction, both groups of students were given pre-tests of reading comprehension. Multiple-choice questions about text content were asked. Means for the experimental and control groups were 29.13 and 29.56 (a score of 0-60), respectively. An independent samples t-test performed on these means confirmed that they were not statistically different, suggesting that there were no gross differences between experimental and control subjects in terms of reading comprehension ability in English. The same kinds of tests were administered as post tests at the end of the training. Gain scores, i.e., the difference between pre-test and post test scores, served as the measures of improvement in reading comprehension.

4.4 Assignment of subjects to ability groups

Subjects were grouped into three levels of L2 reading ability based on their pre-test comprehension scores: Low (0-26), Mid (27-31), and High (32+). Table 1 shows the distribution of low, mid, and high ability subjects in the experimental and control groups. Mean pre-test comprehension scores for the three ability groups were as follows: Low 22.71 (SD = 3.69), Mid 28.88 (SD = 1.42), and High 36.28 (SD = 3.30). The overall mean was 29.35 (SD = 5.93).
Table 1: Assignment of subjects to ability groups based on pre-test comprehension score

<table>
<thead>
<tr>
<th>Ability level</th>
<th>Low (0-26)</th>
<th>Mid (27-31)</th>
<th>High (32+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>8</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>Control</td>
<td>9</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>25</td>
<td>18</td>
</tr>
</tbody>
</table>

5. Results

5.1 Effectiveness of strategy instruction

To find out the effectiveness of strategy training on L2 reading comprehension, both experimental and control groups took part in a post-test of the reading comprehension test after completing the course. The results of the post-test in the two groups were compared using independent samples t-test statistical procedure. Mean and standard deviations of subjects’ pre-test, post test, and gain scores on the comprehension measure are shown in Table 2.

Table 2: Means and SDs of pre-test, post test, and gain scores

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th>Post test</th>
<th>Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>Mean</td>
<td>29.13</td>
<td>34.00</td>
</tr>
<tr>
<td>(n = 30)</td>
<td>SD</td>
<td>5.22</td>
<td>4.56</td>
</tr>
<tr>
<td>Control</td>
<td>Mean</td>
<td>29.57</td>
<td>30.83</td>
</tr>
<tr>
<td>(n = 30)</td>
<td>SD</td>
<td>6.64</td>
<td>6.95</td>
</tr>
<tr>
<td>Total</td>
<td>Mean</td>
<td>29.35</td>
<td>32.42</td>
</tr>
<tr>
<td>(n = 60)</td>
<td>SD</td>
<td>5.93</td>
<td>6.04</td>
</tr>
</tbody>
</table>
The mean scores of the experimental group was significantly different from the control group \((t(59) = -7.77, p < .01)\). This finding indicates that, while there was not any significant difference between experimental and control group in terms of reading comprehension at the beginning of the study, the experimental group surpassed the control group in terms of reading comprehension at the end of the experiment. In other words, strategy instruction had a definite positive effect on students' reading comprehension of the English text passages.

5.2 Students' performance with various reading ability levels

Students' performance within each ability group is summarized in Table 3.

Table 3: Means and SDs of gain scores by ability levels

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Mid</th>
<th>High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental</strong></td>
<td>Mean</td>
<td>8.00</td>
<td>3.53</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>2.73</td>
<td>2.33</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>(n = 8)</td>
<td>(n = 13)</td>
<td>(n = 9)</td>
<td>(n = 30)</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>Mean</td>
<td>1.11</td>
<td>1.50</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.45</td>
<td>1.78</td>
<td>1.36</td>
</tr>
<tr>
<td></td>
<td>(n = 9)</td>
<td>(n = 12)</td>
<td>(n = 9)</td>
<td>(n = 30)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Mean</td>
<td>4.35</td>
<td>2.56</td>
<td>2.55</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>4.11</td>
<td>2.29</td>
<td>2.62</td>
</tr>
<tr>
<td></td>
<td>(n = 17)</td>
<td>(n = 25)</td>
<td>(n = 18)</td>
<td>(n = 60)</td>
</tr>
</tbody>
</table>

Using two-way ANOVA, the interaction between types of reading instruction and ability level was found to be statistically significant \((F(2, 54) = 6.89, p < .01)\). In an assessment of the simple main effects of the types of
reading instruction for each group, simple main effects were found to be statistically significant in the experimental group \( F(2, 54) = 11.78, p < .01 \). On the other hand, in an assessment of the simple main effects of ability level for each group, the simple main effects of the experimental group were statistically significant in the low level and high level group \( F(1, 54) = 43.76, p < .01 \) and \( F(1, 54) = 8.18, p < .01 \), respectively. These results are summarized in Figure 1. The interaction between types of reading instruction and ability level shows that low ability groups responded more positively to strategy instruction than did middle and high ability groups.

![Figure 1: Interaction between types of instruction and ability level](image)

6. Discussion

The major concern of the present research was to examine the effectiveness of explicit metacognitive as well as cognitive strategy training on L2 reading. The results showed that the experimental group outperformed the control group on the L2 reading comprehension test. This suggested that reading strategy instruction had a strong positive effect on L2 readers'
comprehension. The findings also corresponded to previous studies focusing on other types of language skills (e.g., Cohen, Weaver, & Li, 1998; Thompson & Rubin, 1996).

Although all subjects in the experimental group showed considerable gains in the comprehension test, subjects in the low ability group seemed to benefit the most from strategy training. One of the reasons for this could be the mastery of metacognitive strategies.

Most strategy training as well as traditional language teaching has tended to focus only on cognitive strategies (e.g., skimming and scanning), as mentioned in O'Malley (1987). This could help some students to raise their awareness that strategies must be important for efficient language learning. However, this is not enough, because many students (and they tend to be less successful ones) would be unable to utilize these strategies appropriately in the specific settings even though they knew many kinds of strategies. This is where metacognition plays a crucial role because if these students were able to reflect upon their learning processes properly, they would become better prepared to make conscious decisions about what they could do to improve their learning. Metacognition can be a “control tower” that enables students to apply particular strategies in a strategic way.

Therefore, this research attempted to incorporate metacognitive strategies as well as cognitive strategies, and demonstrated the effectiveness of strategy instruction especially for lower level students. The metacognitive supplement was stressed as an essential component in self-regulated strategy training (Wenden, 1987). In other words, to facilitate learning, students must develop motivation or the will to learn to be self-regulated by realizing that they are responsible for and capable of their own self-development and self-determination (Hiromori, 2003, 2004).

In the future, more comprehensive research on other factors affecting strategy use is needed. This should consider attitudes and motivation, learning styles, beliefs, instructors, and learning materials that
are reported to influence students' strategy use. In addition, durability of the training effects should be investigated (e.g., Ikeda & Takeuchi, 2003).

7. Conclusion

Strategy instruction can be a powerful element to help autonomous language learners if it is carefully designed. In fact, it has been suggested that such training can help learners to become more motivated as they begin to understand the relationship between their use of strategies and success in language learning (e.g., Chamot & O'Malley, 1994). Thus, teachers should be more aware of the importance of strategic teaching. If we have sufficient knowledge about how to implement strategy instruction inside or outside our classrooms, we can help our students become more self-regulated learners.

Acknowledgement

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Tsuchiya, T., Hanamitsu, R., & Benfield, B. (2002). *Read up: 22 steps to*


Appendix: A sample material for strategy practice

Homework for Today's Class

ID: __________  Name: ________________

<Today’s Strategy>
Finding Supporting Ideas

<Purpose of this strategy>
前回の授業で学習したように、英語のパラグラフでは Topic Sentence が重要な役割を果たしています。Topic Sentence 以外の文は Details と呼ばれ、Topic Sentence で提示された主題をより良く理解してもらう事柄を述べるものです。Topic Sentence を支えていることから、Supporting Ideas とも呼ばれます。具体的には、主題についてさらに説明を加えたり、具体例を挙げたり、定義したりする働きがあります。

<Practice 1>
別紙プリントを読み、各パラグラフの Topic Sentence に下線を引きなさい。また、その Topic Sentence を支える Supporting Ideas に波線を引きなさい。いくつかある場合には、順に数字を振りなさい。

<Practice 2>
各パラグラフの Supporting Ideas は Topic Sentence をどのように支えていますか。
  e.g.) Example, Definition, Reason, Additional Explanation

（具体例の説明については省略）
<Evaluation>
①Topic Sentence と Supporting Ideas という考え方を利用する利点は何ですか。
具体的に述べてください。

②どんな時に Topic Sentence や Supporting Ideas を利用すると便利だと思いますか。

③このストラテジーが思い通りに使えるためには、どのような練習、あるいは訓練が必要だと思いますか。