METACOGNITIVE AWARENESS OF READING STRATEGIES AND MULTIPLE INTELLIGENCES IN PREDICTION OF ENGLISH READING COMPREHENSION WITH MEDICAL JUNIOR COLLEGE STUDENTS

Yen-ju Hou,
Shu-Zen Junior College of Medicine and Management, Taiwan

The study aims to identify the types of metacognitive awareness as well as Multiple Intelligences with Taiwanese EFLs (English as Foreign Language) at medical junior colleges. In addition, metacognitive awareness and multiple intelligences were investigated to discover whether or not both factors affect students’ English reading performance, specifically in reading comprehension. A total of 454 junior college students from different majors and different age participated in the study. The results indicated that problem-solving reading strategies were used the most, followed by globe reading strategies, whereas support reading strategies were used the least. In terms of multiple intelligences, the most developed intelligence is musical intelligence and spatial intelligence, whereas logical intelligence and naturalist intelligence were found the least developed. Regarding of the effects of variables on English reading performance, overall reading strategy use, problem-solving reading strategies, and intrapersonal intelligence each significantly predicted students’ reading comprehension. It’s hoped that the finding could be helpful for further study as well as teaching.

Keywords: Metacognitive awareness, reading strategy, Multiple Intelligences, reading comprehension

Introduction

Research findings have reported that metacognition has positive effect on learning (Kruger and Dunning, 1999; Schraw and Dennison, 1994). Traditional instruction for reading often stresses on the teaching of vocabulary and grammar. Students are required to spend most of the time memorizing words, structures and grammar. Moreover, it fails to promote students’ comprehension but results in their fear and rejection toward reading. During the studying period, the ultimate goal of teachers and students is how to come up with correct answers on exams. Thus, personal opinion and thoughts do not receive lots of attention on students’ reading process, and the opportunity of using strategies to enhance reading comprehension is neglected.

A key element to enhance comprehension is metacognition, which is a personal’s awareness to manage and monitor the process of cognition. Metacognitive strategic knowledge is a thinking ability involved in the process of reading comprehension. Moreover, students are able to adopt these strategies while reading so as to promote their reading comprehension (Baker & Brown, 1984; Yang, 2002).
In addition to self-awareness on reading, students are born with different intelligences. Thus, the study aims to identify the types of metacognitive awareness of reading strategies and multiple intelligences that Taiwanese EFLs (English as Foreign Language) had at medical junior colleges. In addition, metacognitive awareness of reading strategies and multiple intelligences were investigated to discover whether or not they affect students’ English reading performance, specifically in reading comprehension.

Literature review

Reading comprehension has been identified as the cognitive skill that people use to comprehend what they read. Although reading in a native language (L1) is not the same as reading in a second language (L2), reading in L1 and L2 still share a similar process that can be influenced by various factors in different patterns (Cook, 2001). Among research findings and relative literatures, researcher has concluded four factors that affect second language reading, including readers, text, teachers, and sociocultural elements.

1. **Factors in readers.** First, the ability of decoding to receive meaning by process language. Different levels of decoding ability affect reading comprehension, and it is believed that poor decoding ability leads to poor comprehension (Maria, 1990). Second, prior knowledge and background knowledge are important aids of reading comprehension. It is reported that prior or background knowledge is involved in both L1 and L2 processing of what is read (Cook, 2001). Large portions of learning difficulties result from the lack of general knowledge, especially in cross-cultural backgrounds and situations (Boothe & Walter, 1997).

2. **Factors in text.** First, readability level affects the degree of ease or difficulty when readers read a text, especially in word recognition and comprehension (Maria, 1990). The length of each word and sentence as well as the complexity of structure can cause reading difficulties. Second, content and topic are essential to enable readers to interact with their prior knowledge so as to produce reading comprehension (Maria, 1990).

3. **Factors in teachers.** Other factors that affect second language reading refer to teachers and the school environment. The teachers’ reading instruction (i.e. enough time to read, student-teacher or peer interactions, expectation for reading competence, and adoption of strategies) and class environment (i.e., classroom climate, classroom setting, room arrangement) are crucial to develop readers’ motivation, attitudes, task completion, and reading experience (Celce-Murcia, 2001; Cook, 2001; Grabe, 2002; Maria, 1990).

4. **Factors in sociocultural.** As mentioned earlier, language may be interpreted and comprehended differently as a result of the L2 readers’ social and cultural background and values. For instance, some cultures or educational systems do not encourage reading (Celce-Murcia, 2001) because they emphasize other aspects of language skill. Since L2 reading involves two language systems, L2 readers might, to different degrees, rely on their L1 knowledge and L1 reading ability. However, this raises another concern that linguistic interference might occur during the process of translation and transfer between L1 and L2. (Boothe & Walter, 1997; Celce-Murcia, 2001; Cook, 2001; Grabe, 2002; Johnston, 1984; Maria, 1990; Pearson, Hansen, & Gordon, 1979).

Although there are various factors that affect the ability of reading comprehension, the key factor is strongly associated with the reader’ cognitive skills and metacognition, such as if the
reader has enough prior knowledge to link what they have learnt to the new information, using different strategies to help comprehend reading, and so on (Celce-Murcia, 2001; Farley and Elmore, 1992).

Each student who enters the classroom comes from different family background and possesses different learning styles. Several characteristics are synthesized to help obtain concepts about so-called good reader, and that are: (1) be active and positive reader; (2) know how and when to use different strategies in order to help them comprehend what they are reading; (3) tend to make assumption of any unclear or unfamiliar part on reading; (4) monitor how much oneself comprehend the reading; (5) manipulate different strategies to promote comprehension, and adjust strategies to compromise the part which failed to comprehend successfully by using previous strategies; (6) possess linguistic awareness (Celce-Murcia, 2001; Houtveen and Van de Grift, 2006; Maria, 1990; Tompkins, 2005).

Methodology

Research Design

In order to investigate whether metacognitive awareness of reading strategies and multiple intelligences can be related to learners’ reading comprehension, questionnaire survey is employed to see the comparison of pre- and post-test on reading achievement.

Research Site

The study was conducted at a private five-year medical junior college in Southern Taiwan in the spring of 2012. Students who enroll in the five-year junior college are normally between 16 and 20 years of age. The school contains two academic systems; a two-year college section and a five-year junior college section. There are eleven major departments in the five-year junior college. Except for language departments, English is one of the core subjects for all students and taken normally three hours per week in the first two school years. The medical junior college was selected for this study because the researcher was a faculty member in the department of Applied English, and received the grant and support in implementing the study.

Subjects of the Study

Approximately 490 students who learn English as a foreign language from different departments participated in the study. In addition, before attaining junior college status, all students have been taking English courses for at least three years in junior high school. Compared to the language major students, students from the other departments did not have the same amount of time or number of courses to learn English.

Research Instrument

The research instruments in the study were surveys that included three sections: Metacognitive awareness of reading strategy inventory (MARS, Mokhtari and Reichard, 2002), Multiple Intelligence questionnaire (Gardner, 1993), and a reading test called the General English
Proficiency Test (GEPT). As for the period used for answering, students were able to complete all within 90 minutes.

Section 1: MARSI. The MARSI, developed by Mokhtari and Reichard (2002), was used to identify 6th-12th grade students’ awareness and perceived use of reading strategies while reading academic or relative materials. It is composed of 30 items in 3 scales: Globe Reading Strategies, Problem-solving Reading Strategies and Support Reading Strategies. In order to reduce difficulty and misunderstanding in responding to the questions, MARSI was translated into a Chinese Version by the researcher.

Section 2: Multiple Intelligences questionnaire. The MI questionnaire, conducted by Howard Gardner (1993), is used to identify individual’s development on different intelligences. It is composed of 80 items in eight scales: Logical-Mathematical intelligence, Verbal-Linguistic Intelligence, Visual-Spatial Intelligence, bodily-Kinesthetic Intelligence, Musical Intelligence, Interpersonal Intelligence, Intrapersonal Intelligence, and Naturalist Intelligence.

Section 3: GEPT test. In order to identify students’ English reading comprehension, the reading section of a General English Proficiency Test (GEPT) was used in the study. The GEPT is divided into five levels according to difficulty: elementary, intermediate, high-intermediate, advanced, and superior. The GEPT elementary level was chosen in the study because it is designed for examinees who have achieved at least a junior high school level proficiency. The GEPT reading test has a total of 35 items dealing with three components of reading: vocabulary and structure, cloze texts, and reading for comprehension. Each item contains a statement that requires examinees to choose one answer that best fits its description. The reading test requires 35 minutes for participants to complete, and the maximum score is a total of 120 points.

Procedure

Participants are asked to take a set of questionnaires including the MARSI, MI questionnaire, and the GEPT in the beginning and at the end of the semester. Participants were guaranteed that all data and information was collected anonymously and would not be accessed by anyone other than the researcher. The data was gathered from the survey with a five-point Likert scale, and from the GEPT reading scores. Before data analysis, the researcher checked and edited the data from returned questionnaires. Data of this study collected from the survey are processed by The Statistical Package for the Social Sciences (SPSS, Version 16.0).

Findings

The following information, including descriptive statistics and analysis summary, was described by the research questions of the study.

1. Participants’ Background Information

By removing the uncompleted surveys, valid samples were reduced to a total of 454 full-time students, shown in Table 1, including 100 males (22%) and 354 females (78%).

In addition to gender, participants are mainly from the following department: Applied English (34.1%), Nursing (31.5%), Physical Therapy (15.4%), Dental Laboratory Technology (11.5%), and Occupational Therapy (7.5%). The majority of participants were 341 first-year
junior college students (75.1%) at the age of 16 to 17 years old, whereas the rest students are second- to fourth-year students (24.9%). In addition, Chinese was their native language.

Table 1. Subjects of the study.

<table>
<thead>
<tr>
<th>major</th>
<th>Gender</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>28</td>
<td>127</td>
<td>155</td>
</tr>
<tr>
<td>Nursing</td>
<td>19</td>
<td>124</td>
<td>143</td>
</tr>
<tr>
<td>Physical Therapy</td>
<td>20</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>Dental technology</td>
<td>24</td>
<td>28</td>
<td>52</td>
</tr>
<tr>
<td>Occupational Therapy</td>
<td>9</td>
<td>25</td>
<td>34</td>
</tr>
<tr>
<td><strong>合计</strong></td>
<td>100</td>
<td>354</td>
<td>454</td>
</tr>
</tbody>
</table>

2. Students’ Use of Metacognitive Awareness of Reading Strategy

Among the three types of reading strategies, the ones with higher means are problem-solving strategies ($M = 3.36$, $SD = .807$) and global strategies ($M = 3.30$, $SD = .719$), while the ones with the lowest means are support strategies ($M = 3.18$, $SD = .782$), as shown in Table 2. Moreover, on average students’ overall and the three types of reading strategies reported medium use of reading strategies when reading materials ($M = 2.5~3.4$).

Table 2. Descriptive Statistics of the Use of Reading Strategies.

<table>
<thead>
<tr>
<th>Type of strategy</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>3.28</td>
<td>.732</td>
</tr>
<tr>
<td>Global</td>
<td>3.30</td>
<td>.719</td>
</tr>
<tr>
<td>Problem-solving</td>
<td>3.36</td>
<td>.807</td>
</tr>
<tr>
<td>Support</td>
<td>3.18</td>
<td>.782</td>
</tr>
</tbody>
</table>

Note. $M \leq 2.4$ indicates low use of strategies while reading; $2.5 < M < 3.4$ indicates medium use of strategies while reading; $M \geq 3.5$ indicates high use of strategies while reading.

3. Students’ Multiple Intelligences

Among the eight types of multiple intelligences, students performed the best on Musical Intelligence ($M = 3.49$, $SD = .673$), followed by Visual-Spatial Intelligence ($M = 3.36$, $SD = .555$), Interpersonal Intelligence ($M = 3.24$, $SD = .593$), Intrapersonal Intelligence ($M = 3.32$, $SD = .642$), Verbal-Linguistic Intelligence ($M = 3.23$, $SD = .644$), Bodily-Kinesthetic Intelligence ($M = 3.09$, $SD = .641$), whereas Logical-Mathematical intelligence ($M = 2.99$) and Naturalist Intelligence ($M = 2.75$, $SD = .680$) revealed the lowest scores.
4. Students’ English Reading Comprehension

On average reading scores, as shown in Table 3, revealed that second-year students scored the highest ($M = 66.32, SD = 20.052$) on English reading comprehension than the other four groups (1: $M = 52.46, SD = 22.862$; 3: $M = 65.32, SD = 20.052$; 4: $M = 53.71, SD = 16.912$; 5: $M = 34.29, SD = -$). The results showed that the second-year and third-year groups had better English reading scores than the other three groups.

Table 3. Descriptive Statistics of Reading Comprehension Scores by Grade.

<table>
<thead>
<tr>
<th>Grade</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>341</td>
<td>90</td>
<td>19</td>
<td>3</td>
<td>1</td>
<td>454</td>
</tr>
<tr>
<td>M</td>
<td>52.46</td>
<td>66.32</td>
<td>65.32</td>
<td>53.71</td>
<td>34.29</td>
<td>55.75</td>
</tr>
<tr>
<td>SD</td>
<td>22.862</td>
<td>20.052</td>
<td>26.741</td>
<td>16.912</td>
<td>*</td>
<td>23.156</td>
</tr>
</tbody>
</table>

* The number of fifth-year participant is only one so that there is no Std. Deviation.

5. Relationships Among Reading Strategy Use, Multiple Intelligence and English Reading Achievement

A regression analysis (see Table 4) was employed to determine the relationships of three types of reading strategy use, eight multiple intelligences and English reading achievement. In terms of individual variable, grade ($\beta = .173, p < .001$) and problem-solving strategy use ($\beta = .292, p < .05$) both held significant relationships with students’ reading comprehension.

For the three types of reading strategy, students who used more problem-solving reading strategies performed better reading comprehension than those who used fewer problem-solving strategies.

In terms of each multiple intelligence, only interpersonal intelligence ($\beta = .144, p < .05$) held significant relationships with students’ reading scores. Students who possessed better interpersonal intelligences achieved higher scores in English reading than those of holding fewer interpersonal intelligences.

Table 4. Regression Analysis Summary for Variables Predicting English Reading Performance.

<table>
<thead>
<tr>
<th>Variables</th>
<th>$B$</th>
<th>$SEB$</th>
<th>$\beta$</th>
<th>$T$</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td>-1.225</td>
<td>.675</td>
<td>-.075</td>
<td>-1.814</td>
</tr>
<tr>
<td>grade</td>
<td>1.934</td>
<td>.451</td>
<td>.173</td>
<td>4.285***</td>
</tr>
<tr>
<td>reading strategy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>global</td>
<td>1.186</td>
<td>.881</td>
<td>.126</td>
<td>1.346</td>
</tr>
<tr>
<td>problem-solving</td>
<td>2.442</td>
<td>.764</td>
<td>.292</td>
<td>3.196**</td>
</tr>
<tr>
<td>support</td>
<td>.876</td>
<td>.712</td>
<td>.101</td>
<td>1.231</td>
</tr>
</tbody>
</table>
Summary of the Findings and Results

According to the finding, summary of the results are presented below: Second-year students performed better in reading than other groups. On overall reading strategy use, students revealed a medium use of metacognitive awareness of strategies on reading.

1. On individual reading strategies, students used more problem-solving strategies, followed by global strategies, whereas support strategies were used the least.
2. In the study, it is found that students have better intelligences on musical and Visual-Spatial intelligence, but weak with Logical-Mathematical and Naturalist intelligence.
3. Students who had better intelligences on interpersonal performed better in reading comprehension than that of having lower interpersonal intelligences.
4. Students who used more problem-solving strategies on reading achieved better reading comprehension than that of using less problem-solving strategies.

Discussion and Implication

The following discussion is described based on the results and findings and includes two sections: (1) the relationship of metacognitive awareness of reading strategies to English reading performance; (2) students’ multiple intelligences; (3) relationships among metacognitive awareness of reading strategies, multiple intelligences, and reading achievement. Possible explanations for the findings are provided in each section;

Metacognitive Awareness of Reading Strategy Use Relationship to English Reading Comprehension

The overall frequency of strategy use in the study was in the medium use. In terms of reading strategy use, the strategy that Taiwanese EFL students used the most was problem-solving strategy, and this has been supported by studies (Alsheikh, 2002; Chen, 2007; Chen, 2010; Hu,
2011). Moreover, other results have also reported that support strategy was found to be the least used (Al-Nujaidi, 2003; Chen, 2007; Chen, 2010; Wu, 2005).

For the use of overall reading strategies, students who used more reading strategies scored better in English reading than those who used fewer strategies. According various research findings, it was reported that the training of metacognitive reading strategy has positive effect on developing students’ reading performance (Tseng, 2009; Wu, 2012). That is, reading comprehension could be promoted through metacognitive reading strategy training which helps increase the use of strategies on reading.

In terms of individual reading strategy use, students who used more problem-solving reading strategies scored better in English reading than those who used fewer problem-solving strategies. The finding can be explained by a fact that English, instead of reading for fun, is an academic subject which is used to examine students’ English performance. Thus, students are taught to seek for the right answers as soon as possible. In addition, intense class schedule could not offer student enough time and opportunity to search supportive information related to the reading materials.

**Students’ Multiple Intelligences**

On individual intelligence, students perform well on Musical Intelligence, Visual-Spatial Intelligence, Interpersonal Intelligence, Intrapersonal Intelligence, Verbal-Linguistic Intelligence, and Bodily-Kinesthetic Intelligence, with an average between 3.49 and 3.90, whereas Logical-Mathematical intelligence and Naturalist Intelligence revealed the lowest scores, with an average of 2.75 to 2.99. By researching the current studies, most of them are centered in elementary and junior high school students. Thus, it seems to lack of studies on senior high students.

Musical Intelligence was found the one that students performed the best, however, it failed to find other relative studies to support this finding. The likely finding can only be found in Wu’s (2012) study on elementary students. However, Han’s (2006) study on elementary students and kao’s (2011) study on college students found the opposite result. From researcher’s observation, it could be explained by a fact that the ways students learn has changed. Students listen to music or watch musical concept more than before, and try to link what they learn through music (rhyme or lyrics).

**Relationships Among Metacognitive Awareness of Reading Strategy Use, multiple Intelligences and English Reading Comprehension**

For the use of overall reading strategies, students who used more reading strategies scored better in English reading than those who used fewer strategies. According various research findings, it was reported that the training of metacognitive reading strategy has positive effect on developing students’ reading performance (Tseng, 2009; Wu, 2012). That is, reading comprehension could be promoted through metacognitive reading strategy training which helps increase the use of strategies on reading.

In terms of individual reading strategy use, students who used more problem-solving reading strategies scored better in English reading than those who used fewer problem-solving strategies. The finding can be explained by a fact that English, instead of reading for fun, is an academic subject which is used to examine students’ English performance. Thus, students are taught to seek for the right answers as soon as possible. In addition, intense class schedule could not offer
student enough time and opportunity to search supportive information related to the reading materials.

As for multiple intelligences, only intrapersonal intelligence revealed significant relationships with students’ reading scores. Students who possessed better intrapersonal intelligences achieved higher scores in English reading than those of holding fewer intrapersonal intelligences. Based on the researcher’s class observation, the possible explanation could be that the teacher-led instruction is no longer the only options among the current teaching methods. That is, teachers would adopt activities that promote teacher-student interaction, such as group discussion and Q&A. Students could learn to enhance their reading comprehension through the process of group discussion and grouping activities.

**Implication**

Through research findings and results, it is widely considered that there is no one theory or instruction that is either the most effective or the least effective results. Therefore, an optimal learning outcome requires educators to be flexible on adjusting their instruction, and make continuous efforts on designing teaching method. Thus, based on this study findings and researcher’s observation, two implications are provided as further teaching reference.

**Reading Strategies Instruction**

Researchers have found that strategies are teachable, and that they help improve students’ performance on comprehension tests and recall (Carrell, 1985; Janzen, 2001; Pearson & Fielding, 1991). It is also pointed out that good readers are always knowing when and how to use strategies to comprehend written materials (Celce-Murcia, 2001; Tompkins, 2005). However, continuous and explicit training for reading strategy use is not available because of the intense academic schedule. Thus, it will be helpful for teachers to design proper course by identifying students’ type of reading strategy use. Then, it is suggested to involve different strategies and practice into curriculum based on students’ use of reading strategies. In addition, for those who have not had the opportunity to learn the use of strategies, it is essential to provide students explicit expression about different types of strategies and the purpose to use that strategies. Thus, students will be able to learn how and when to use strategies while reading for comprehension.

**Effective Teaching Strategies for Reading Comprehension**

In the study, students were reported to possess medium use of strategies on reading. That is, students adapted strategies to help comprehend written text, either intentionally or spontaneously. It comes to an agreement that better readers are often strategic and skillful (Celce-Murcia, 2001; Tompkins, 2005). Besides, since the 1970s, a number of models and strategies of reading comprehension have been developed. Research for the National Reading Panel has identified five effective reading comprehension strategies which are “summarization, self-questioning, story structure instruction, graphic and semantic organizer, and comprehension monitoring” (Taylor, et al., 2006, p.305). To this point, Brown and Palincsar (1989) provided four reading strategies, called reciprocal teaching, that should be taught to students: summarizing, predicting, clarifying, and asking questions.

According to the research findings, reciprocal teaching (RT) has been reported a significance on promoting metacognition (Huang, 1996; Yang, 2002) and reading
comprehension (Frances & Eckart, 1992; Hsieh, 2010; Lin, 2012; Tsai, 2010; Ya, 2010; Yang, 2002). The aims of RT are to let students engage in generating questions while reading, and those aims lead to another instruction which is called responsive engagement. Since comprehension is dealing with cognitive features, responsive engagement instruction aims to provide practices for students to engage keenly with text and then enhance their comprehension through developing cognitive skills (Taylor, et al., 2006). Since English reading is often taught as an academic subject in most Taiwanese classes and finding the answer is always the only mission to read. That is, it left no need to students to probe the information behind the written text and then to connect it to their prior knowledge. Therefore, it is necessary to offer students the training and practice about using the four types of RT. Asking questions, for instance, is one of the most common modes to engaging responsively. Different levels of questions lead to different levels of cognitive engagement with text. It is found that teachers who use more high-level questions significantly improve students’ reading comprehension (Arends, 1994; Rothenberg & Fisher, 2007; Taylor, Pearson, Clark, & Walpole, 2000; Taylor, et al., 2006; Wilen, 1991).

References

