The impact of top-down, bottom up, and integrated reading strategies on college-level ESL learners’ performance on the reading and writing sections of the TOEFL

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THE IMPACT OF TOP-DOWN, BOTTOM-UP, AND INTEGRATED READING STRATEGIES ON COLLEGE-LEVEL ESL LEARNERS’ PERFORMANCE ON THE READING AND WRITING SECTIONS OF THE TOEFL

Introduction

The strategies readers employ are often divided into two broad categories, which are known as bottom-up and top-down. Bottom-up strategies involve analyzing mechanics at the sentence-level, such as vocabulary and grammatical features. The readers think about how individual sentences and the words within them fit together. Top-down strategies involve viewing the text as a whole, which includes analyzing context, writing-purpose, and rhetorical structure. When these strategies are employed, readers must activate their background knowledge about both the topic at hand and common writing structures (Andrews & Bond, 2009; Brown, 2007; Carrell, 1988; Carrell & Eisterhold, 1988; Eskey, 1988; & Smith, 1988).

Some studies have focused on discovering which strategies people already use. Abbott (2010) and Abbott (2006) show that Mandarin speakers tend to use bottom-up while Arabic speakers tend to use top-down. Undergraduates at Oxford were discovered to use top-down reading strategies, and Martin (1979) argues that a top-down model better represents how people read. However, other research has shown that people use both top-down and bottom-up strategies (Kurby, Britt, & Magliano, 2005).

There is not only conflict about which strategies people use more often, there is also some disagreement among scholars as to whether top-down, bottom-up, or integrated strategies are more effective for building reading comprehension in students. Other studies suggest top-down strategies are more effective (Furugori, 1988). Some pedagogical experts recommend combining top-down and bottom-up approaches into an integrated approach (Birch, 1998; Brown, 2007; & Celce-Murcia & Olshtain, 2000).
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Literature Review

Bottom-Up Strategies

Brown (2007) argues that in bottom-up processing, readers must first identify linguistic
signals such as “letters, morphemes, syllables, words, phrases, grammatical cues, or discourse
markers” (p. 358). Then they use their mental data-processing device to put these signals in order.
During the data-processing, students need to know the complexities of the language system.

To investigate the usage of bottom-up and top-down reading strategies, Abbott (2006)
carried out a study involving seven Arabic and eight Mandarin-speaking intermediate ESL
learners. The study revealed that Arabic-speaking participants differed systematically from
Mandarin-speaking participants in that they preferred to use top-down strategies. In contrast,
Mandarin-speakers preferred bottom-up strategies. Arabic ESL learners may have greater
success in using top-down strategies than ESL learners from non-alphabetic L1 backgrounds
such as Chinese.

Abbott (2010) argues that L2 reading strategies can be divided into two groups - bottom-
up and top-down. “Bottom-up reading comprehension strategies are data-driven, whereas top-
down strategies are conceptually or hypothesis-driven” (p. 15). To examine the differences in
usage of reading strategies among Arabic and Mandarin ESL speakers, Abbott used the reading
test from the Canadian Language Benchmarks Assessment (CLBA). Before conducting a reading
comprehension check, an interview with all participants about their personal-background was
conducted. Then the CLBA Reading Assessment was used for the reading comprehension check.
The result shows that Arabic-speaking ESL learners tend to use a more top-down approach to
reading while Mandarin-speaking ESL students use bottom-up reading strategy.

Andrews and Bond (2009) state that “skilled readers rely on high quality lexical
representations that afford autonomous lexical retrieval and reduce the need to rely on top-down context” (p. 687). Their experiment investigated this hypothesis by comparing the performance of reading comprehension and spelling performance. The research focused on individual preferences with regard to top-down and bottom-up processes. In this study, 109 university students were classified into four groups: good readers and good spellers (GRGS), good readers and poor spellers (GRPS), poor readers and good spellers (PRGS), and poor readers and poor spellers (PRPS). The researchers measured participants’ comprehension of a reading passage based on the ACER Co-Operative Reading Comprehension Test. It contains short passages with three to six multiple-choice questions assessing comprehension. To provide a comprehensive measure of spelling, the researchers used The Spelling Dictation test and the Spelling Recognition test. In The Spelling Dictation test, participants read aloud twice and write down the words’ spelling. In The Spelling Recognition test, participants evaluated a list of 44 correctly spelled and 44 misspelled words. The results of these tests showed that good spellers relied less on top-down context than poorer spellers.

**Top-Down Strategies**

Top-down processing is closely tied to the concept of schemas in second language acquisition. Brown (2007) refers to top-down processing as “conceptually driven processing in which we draw on our own intelligence and experience to understand a text” (p. 358). This is often described in terms of analyzing and creating meaning from the big picture of a text, unlike bottom-up processing, which involves decoding smaller bits of words and sentences to create meaning. Abbot (2006) explains the difference between bottom-up and top-down strategies; “bottom-up reading comprehension strategies are data-driven, detail-oriented strategies, whereas top-down strategies are conceptually driven, big-picture oriented strategies” (p. 635). Top-down
reading strategies are often associated with high-level or advanced learners, but some research has shown that there are cultural factors in education that lead intermediate learners to favor bottom-up or top-down strategies (Rao, 2003; Eskey, 2005; Abbott, 2006; & Abbott, 2010).

Readers engaging in top-down processing draw on their previous knowledge (schemas) to interpret a text. Rao (2003) argues that “the more world-knowledge that a reader brings to the text, the less dependent he or she is upon purely linguistic information such as grammatical, syntactic and semantic clues, thus making his or her reading process more efficient” (p. 31-32). Rao believes that top-down processing strategies could greatly improve English education in China, where teaching practices have traditionally focused on formal grammar instruction and other bottom-up decoding strategies. Rao argues that “the process of reading comprehension is guided by the principle that every input is mapped against some existing schema and that all aspects of that schema must be compatible with the input information” (p. 32). In other words, top-down processing is dependent upon fitting new information into learners’ previous knowledge (schemata).

There is some evidence that top-down processing is favored by Arabic learners. Abbott (2006) discovered through surveys of intermediate learners that Mandarin speakers preferred bottom-up strategies such as scanning, paraphrasing, and matching. However, intermediate Arabic speakers preferred top-down strategies, such as skimming, connecting, and inferring. Abbott argues that the reason that there are such stark differences in the strategies used by students from these cultural backgrounds is connected to the way they are taught language in their home countries (p. 638). According to Abbott, “Chinese teachers tend to use traditional teacher-centered approaches to teaching English as a foreign language” (p. 638); whereas, “in contrast, the general trend in Arab nations is to place more emphasis on student-centered EFL
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activities that encourage linguistic interaction through the use of authentic, real-life tasks” (p. 639).

**Integrated Strategies**

Grabe (2004) conducted review of the previous studies on the reading theory, research, and assessment. Based upon his review of research, he created ten applicable components for reading instruction, material development, and curriculum designing: (1) ensuring the word recognition fluency, (2) emphasizing vocabulary learning and creating a vocabulary-rich environment, (3) activating background knowledge in appropriate ways, (4) ensuring effective language knowledge and general comprehension skills, (5) teaching text structures and discourse organization, (6) promoting the strategic reader rather than teaching individual strategies, (7) building reading fluency and rate, (8) promoting extensive reading, (9) developing intrinsic motivation for reading, and (10) planning a coherent curriculum for student learning. While Grabe states that the instructors need to determine the instructional priority based upon student needs, institutional expectations, and resource constraints, he also states that all the implications above are potentially important components of an extended reading curriculum. This research strongly demonstrates a possibility that the integration of both top-down and bottom-up reading components is paramount for L2 reading instruction. As listed above, components (1), (2), (4) and (5) focus primarily on the bottom-up reading approach, while component (3) emphasizes the importance of the top-down reading strategies. However, Grabe does not put priority in his research, but rather he states that all the components are important. In other words, his review of previous research implies the importance of integrating both top-down and bottom-up reading strategies.

Wilawan (2006) investigated the efficacy of the combination of training in lexical
cohesion and metacognitive strategies on Thai EFL learners’ comprehension of main ideas. In her study, 60 undergraduate students at Kasetsart University in Bangkok were randomly divided into three groups and each of which was assigned to one of three teaching situations: (1) lesson incorporating training for lexical cohesion and metacognitive strategies, (2) metacognitive strategy training alone, or (3) traditional skill-based teaching. The participants’ reading proficiency was assessed by the Main Idea Comprehension Test at the onset and the end of the experimental instructions. The diagnostic reading test was sampled by the main idea comprehension exercises in different ESL/EFL reading workbooks created by the researchers (p. 107). From the test results, Wilawan found that participants who received the integrated instruction outperformed the other groups, although the post-test score did not show a statistically significant difference among three groups. However, the author concluded that her research result suggested that the students’ development of main idea comprehension was related to the combination of bottom-up, top-down, and metacognitive strategic processes. Wilawan’s research implies the importance of an integrated approach toward traditional L2 reading methods (bottom-up and top-down).

Finally, Brown (2007) mentions the efficacy of three different L2 reading approaches: bottom-up, top-down, and integrated reading approaches. While he states that bottom-up and top-down reading approaches have been the cornerstone of L2 reading strategies for years, he also emphasizes that more recent studies focus on a combination of those two strategies.

All of these studies regarding integrated approaches suggest that they are more reliable than traditional methods involving separate bottom-up and top-down instruction and thus can more greatly benefit students’ proficiency.

For this action research project, we also investigated which of these strategies is the most
effective: bottom-up, top-down, or a combination of them. We aimed to explore whether top-
down, bottom-up, or integrated strategies are more effective for ESL learners in reading
comprehension. Furthermore, we wanted to know whether these strategies effect how well ESL
learners perform on TOEFL-like reading and writing comprehension quizzes.

Methodology

Top-down and bottom-up strategies

Past research has identified a number of specific strategies involved in either top-down or
bottom-up reading processes (Abbott, 2006; Abbott, 2010). Bottom-up strategies all require
readers to break down texts into their most basic elements of meaning. For instance, readers may
identify the meaning of unknown words by dividing them into their component morphemes and
analyzing each morpheme separately. Readers may also analyze sentences grammatically for
their syntax, tense, reference, punctuation, and clausal construction in order to determine what is
happening in them and how they relate to neighboring sentences. They may also pay careful
attention to the body of text surrounding a particular word or phrase. This involves looking for
nearby visual aids, synonyms, or examining general context to determine the meaning of
unknown words and phrases. The readers may even be able to identify a paraphrase that sums up
a difficult word or phrase. When it comes time to answer questions based on a passage, readers
using bottom-up strategies will pull out only small pieces of information being requested. They
may also match important vocabulary in a question with the corresponding vocabulary in the text.

In contrast, top-down strategies are holistic and all require readers to combine and
synthesize different pieces of information (Abbott, 2006; Abbott, 2010). This could involve
skimming over an entire text to locate important points and gain a general understanding of the
text. Locating important information becomes easier if reader can first identify the discourse
structure of the text. Once this has been determined, it becomes easier to predict where in the text desired information is located. Then related pieces of information can be combined and unrelated information eliminated to gain an understanding of a particular topic. Once a text has been read, students can use it to make inferences by extending chains of thought to reach new conclusions. This might also involve an analysis of the author’s motives by asking questions about text structure and intended audience, as well as included and excluded information. Finally, readers can analyze the implications of a text by combining the information presented in the text with their background knowledge.

Activities

The activities used in our study were meant to simulate the use of these bottom-up and top-down strategies in an authentic reading situation. Thus the activities were designed to induce these strategies in students’ minds without the students being aware that they were being nudged in a certain cognitive direction. The first section of the bottom-up activities dealt extensively with difficult vocabulary. Students were given a list of key vocabulary words with definitions that were gleaned from the text. Thus they only included information that could be found through context clues and restatements within the text itself. Some of the definitions were also accompanied by information about relevant root words. The second section of the bottom-up activities gave students complex sentences that had been broken into short phrases. The students were asked to use their knowledge of grammar to combine the segments back into complex sentences. This was supposed to stimulate the use of grammatical analysis among the students.

The top-down activities comprised three parts. The first was a general outline of the text to help students pick out main ideas and understand the discourse structure of the text. The second section was an association activity in which students were asked to come up with words
they associate with subject of the text. The third section was a prediction activity in which students were given topic sentences from the text and asked to predict what details might follow in the subsequent paragraphs. These two activities were meant to activate students’ background knowledge. All students were given the top-down and bottom-up activities at the same time because both sets of activities took approximately the same amount of time to complete. The integrated group was given shortened versions of both the bottom-up and top-down handouts. This shortened version had fewer vocabulary items, grammar exercises, and prediction. However, the integrated activities were still slightly longer, so the students were given five more minutes to complete them.

**Participants**

As stated earlier, our study investigates the efficacy of the top-down, bottom-up, and integrated reading approaches in second language reading. 15 international students (12 males and 3 females) ranging from 19 to 29 years old at Minnesota State University, Mankato voluntarily participated in our research. All the participants were taking the intensive English classes ESL 102 (Speaking & Listening) and ESL 112 (Reading & Writing) as part of their English proficiency course requirement. Their L1 backgrounds were Arabic (n=7), French (n=3), Ukrainian (n=2), Korean (n=1), Chinese (n=1), and Vietnamese (n=1). Their English proficiency level varied from 16 to 59 on the TOEFL iBT score. The 15 participants were divided into three groups (top-down, bottom-up and integrated) based upon their performance on their previous writing assignments and in-class activities in an attempt to create groups of equal proficiency. For more detailed information, please see table 1.
Table 1

*Participants’ proficiency levels and L1 in each group*

<table>
<thead>
<tr>
<th>Top-down group</th>
<th>Bottom-up group</th>
<th>Integrated group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>L1 background</td>
<td>Participants</td>
</tr>
<tr>
<td>Participant T-1 (H)</td>
<td>French</td>
<td>Participant B-1 (H)</td>
</tr>
<tr>
<td>Participant T-2 (H)</td>
<td>French</td>
<td>Participant B-2 (H)</td>
</tr>
<tr>
<td>Participant T-3 (I)</td>
<td>Arabic</td>
<td>Participant B-3 (L-I)</td>
</tr>
<tr>
<td>Participant T-4 (L-I)</td>
<td>Arabic</td>
<td>Participant B-4 (L-I)</td>
</tr>
<tr>
<td>Participant T-5 (L)</td>
<td>Ukraine</td>
<td>Participant B-5 (L)</td>
</tr>
</tbody>
</table>

* (H) indicates “High proficiency level”, (I) indicates “Intermediate proficiency level”, and (L) indicates “Low proficiency level”.

As can be seen above, each group had at least one high and one low proficiency level participant so that the groups had approximately even language abilities. Moreover, since Abbott (2006) found that English learners of Arabic are more familiar with top-down reading strategies, each group had at least two Arabic speakers in order to investigate the genuine efficacy of the three different reading approaches.

Before the day of the study, all the participants signed a consent form approved by the Institutional Review Board at Minnesota State University, Mankato.
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Procedure

Test administration

Our research was conducted from March 22<sup>nd</sup> to March 23<sup>rd</sup> of 2012. All the participants were given (1) a background information questionnaire, (2) a TOEFL-based reading proficiency test, and (3) a TOEFL-based independent writing test. The questionnaire asked the participants’ age, first language, previous language learning experience, test scores on TOEFL, IELTS, and TOEIC, their daily language exposures, and so on. For the reading proficiency test, we utilized an authentic TOEFL practice test from Barron’s TOEFL iBT (Sharpe, 2010). The particular exercise we selected was based on a passage about the origin of civilization. For the independent writing test, students were asked to write an essay dealing with civilization. For details about our test-administration procedure, please see table 2.

As stated earlier, 15 participants were divided into three groups, and each group was provided different handouts. The top-down group was provided with an outline of the reading text, a word association question and four prediction questions. The bottom-up group received 20 word-definitions of the crucial vocabularies for fluent reading and seven grammar practices, which were actually used in the reading text. The integrated group was provided with a handout containing reduced numbers of top-down and bottom-up activities. During later analysis, we classified the reading comprehension questions into eight bottom-up and five top-down questions.

Since our research also attempted to investigate how the three approaches impact on participants’ writing performance, we utilized the same handouts as scaffolding for the writing test. In order to facilitate our participants’ smooth transition into the writing task, we utilized the same passage to create our writing question. Students were also given time to review their handouts at the beginning of the second testing day.
Table 2

_Reading & Writing test administration_

<table>
<thead>
<tr>
<th><strong>Reading Proficiency Test</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Making 3 reading approach groups (T-D, B-U, and Intg)</td>
</tr>
<tr>
<td>Explanation on the reading task</td>
</tr>
<tr>
<td>Distributing handouts (T-D, B-U, and Intg)</td>
</tr>
<tr>
<td>15-20 minutes to work for handouts</td>
</tr>
<tr>
<td>30 minutes to work for reading test</td>
</tr>
<tr>
<td>Collecting all the handouts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Writing Test</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributing handouts &amp; Refreshing the information</td>
</tr>
<tr>
<td>Collecting all the handouts</td>
</tr>
<tr>
<td>30-40 minutes to work for writing test</td>
</tr>
</tbody>
</table>

**Evaluation method**

_Evaluation of reading test_

The reading assessment was drawn from an authentic TOEFL iBT practice book (Sharpe, 2010) and contained a total of 13 reading questions. The last of these was worth two points. Thus the participants’ reading scores were based on a 14 point scale.

_Evaluation of writing test_

A norming assessment based upon the TOEFL writing rubric was used to train raters in order to ensure grading consistency. Each essay was evaluated on a scale of one to five points by
three different readers. When an essay received a score which varied by two or more points between different readers, it required a fourth reader.

**Results**

**Data Analysis**

The first stage of the analysis was to verify that all groupings within the experiment were equal. The first stage of this process was to test the difficulty of the comprehension questions. This involved categorizing the questions based on whether they primarily involve top-down or bottom-up strategies. For instance, a question that asks for a specific fact, such as a date, is primarily bottom-up. Whereas a question that asks the reader to choose the option that is not true is primarily top-down because it requires the reader to combine several pieces of true information. Once all questions were categorized, it was possible to run and ANOVA test of question success rates to determine if one type of question was harder than the other. Similarly, an ANOVA test was performed to determine if the experimental groups had equal proficiency to begin with. In this analysis, the participants’ previous grades in the class were used as a proxy for their global language proficiency.

The next stage of analysis involved demographic variables. A regression analysis of experimental test scores and previous class grades was performed to determine if there was correlation between previous proficiency and scores in this study. A regression analysis was also performed to determine if there was a link between scores in this study and such variables as years of English study or time spent living in the United States. Finally, the experimental group’s scores were compared using a Chi-square test to determine if the strategies had an effect on reading comprehension scores.
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Findings

The first ANOVA test showed that top-down and bottom-up questions were equally difficult because there was no significance difference in the success rate on these two types. This increases the probability that differences in scores were attributable to the success of the handout for overall comprehension rather than for specific question types. The second ANOVA test showed that there was no statistically significant difference in the proficiency of the three groups. This is important because it shows that our student placement was successful in creating comparable groups. The first of the regression analyses showed that there was a strong correlation between previous proficiency and reading comprehension scores (See Figure 1), as well as a small correlation between proficiency and writing scores (See Figure 1). The demographic regression analysis showed a small correlation between the number of months participants had already been living in the United States and their reading comprehension scores (See Table 3). This makes sense because reading is a daily part of life in an American university, but writing opportunities are rarer and may be easier to avoid. Finally, the Chi-square analysis did not show a significant effect of group placement on study scores. However, the effect of group placement on reading was close to the threshold of statistical significance (p=0.12).

Although we could not show statistical significance, the study results still show patterns when displayed graphically. The first set of charts shows overall reading score by group (See Figure 1). The integrated group achieved the highest average score, while the top-down group achieved the lowest average score, and the bottom-up group was in the middle. When the scores are examined by question type, the results remain the same. The integrated group had the highest scores, with the top-down group at the bottom, and the bottom-up group in the middle (See Figures 2 & 3). Within the writing portion, the top-down and bottom-up groups switched ranks,
but the integrated group remained firmly in first place (See Figure 4).

Table 3

*Statistically significant correlations of participants’ scores and demographic data*

<table>
<thead>
<tr>
<th></th>
<th>Multiple R</th>
<th>R Square</th>
<th>Significance F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months in U.S. and Reading Score</td>
<td>0.4555</td>
<td>0.2074</td>
<td>0.0880</td>
</tr>
<tr>
<td>Proficiency and Reading Score</td>
<td>0.6759</td>
<td>0.4569</td>
<td>0.0057</td>
</tr>
<tr>
<td>Proficiency and Writing Score</td>
<td>0.5902</td>
<td>0.3483</td>
<td>0.0559</td>
</tr>
</tbody>
</table>

*Figure 1. Average scores of our three different strategy groups on all reading questions*
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Figure 2. Average scores of our three different strategy groups on bottom-up reading questions

Figure 3. Average scores of our three different strategy groups on top-down reading questions
Discussion

The results demonstrate that the integrated group performed best on reading and writing tests. That suggests that a combination of bottom-up and top-down strategies seems to be the most effective for ESL students’ reading and writing performance. One of the possible reasons for this result is that integrated group had both bottom-up and top-down activities that dealt with the same text sections on the pre-reading handouts. Thus, they might have had a better chance to understand the reading passage when they could analyze it twice, from both directions.

The verification of differences in group scores was not statistically significant because of the small sample size. However, the fact that the groups initially had equivalent proficiency
levels, and yet the integrated group always performed the best in both reading and writing tests could imply the efficacy of integrated reading strategies. Future studies are highly recommended and should be conducted with a larger sample sizes so as to investigate effectiveness of strategies on the English literacy skills with stronger statistical evidence.

The correlations between previous proficiency and months in the United States with reading comprehension support the idea that demographic variables may have a large effect on test results. In other words, the improvement of reading and writing performance could be noticeable when students have more target language exposure. Therefore, it may be useful to control for demographic variables in future studies. It would also be useful to add a control group to determine just how much of a benefit is provided by each handout.

Finally, although participants were divided into high, intermediate and low proficiency groups for the purposes of this study, most of their abilities were actually located at the low end of the spectrum. In other words, they might encounter difficulties in understanding top-down pre-reading handouts when used without bottom-up structuring. Future studies are suggested to investigate students with a wider variety of proficiency levels.
References


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