Learning by Summarizing

SUMMARY

Summarizing involves restating the main ideas of a lesson in one’s own words. For example, a student may read a chapter in a history textbook and write a one-sentence summary stating the main idea after each paragraph. The theoretical rationale for summarizing is that it encourages learners to select the most relevant material from a lesson, organize it into a concise representation, and integrate it with their existing knowledge by using their own words. In twenty-six out of thirty experimental comparisons, students who were asked to generate summaries during learning performed better than a control group that was not asked to generate summaries on a subsequent test of the material, yielding a median effect size of $d = 0.50$. Regarding boundary conditions, summarizing may be most effective when students are provided with pretraining in how to summarize and when lessons do not involve complex spatial relations. Regarding applications, summarizing can be used as a form of note taking when learning from text or from lecture-based instruction.
Learning by Summarizing

BOX 1. *Overview of Learning by Summarizing*

<table>
<thead>
<tr>
<th>Definition</th>
<th>Learners restate the main ideas of a lesson in their own words.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>Students are asked to read a history lesson and to write a summary sentence stating the main idea in their own words after each paragraph.</td>
</tr>
<tr>
<td>Theoretical rationale</td>
<td>Summarizing involves selecting the main ideas from the lesson, organizing them into a more concise cognitive representation, and integrating them with prior knowledge by restating the material in one's own words.</td>
</tr>
<tr>
<td>Empirical rationale</td>
<td>The summarization effect is upheld in twenty-six of thirty tests, yielding a median effect size of $d = 0.50$.</td>
</tr>
<tr>
<td>Boundary conditions</td>
<td>The summarization effect may be strongest when students receive instruction in how to summarize effectively and when the content of the lesson does not contain complex spatial relations (such as physics or chemistry concepts).</td>
</tr>
<tr>
<td>Applications</td>
<td>Summarizing can be applied as a note-taking strategy for learning from text passages and from lecture-based instruction, and for topics within the social sciences and humanities, as well as narratives.</td>
</tr>
</tbody>
</table>

CHAPTER OUTLINE

1. Example of Summarizing as a Learning Strategy
2. What Is Learning by Summarizing?
3. How Does Summarizing Foster Learning?
4. What Is the Evidence for Summarizing?
5. What Are the Boundary Conditions for Summarizing?
6. How Can We Apply Summarizing?
7. Conclusion
EXAMPLE OF SUMMARIZING AS A LEARNING STRATEGY

Please read the following passage and write a summary sentence stating the main idea in your own words:

To be assured her brothers would be prepared, she had prepared a message in advance. Since specific officials examined all of the slaves’ mail, Harriet’s message was addressed to a man named Jacob Johnson, who secretly assisted the Underground Railroad, and who was one of the relatively free black men in Maryland. However, even Jacob’s mail might be searched, so Harriet had to be cautious. Her message stated: “Inform my brothers to always be devoted to prayer, and when the sturdy aged fleet of vigor glides along to be prepared to unite aboard.”

Write your one-sentence summary here:

Now, as a test of your understanding of the story, without referring back to the passage or your summary, please circle the letter corresponding to your answer for the following question:

Harriet’s code which told her brothers to “be prepared to unite aboard,” meant:

a. To beware of specific officials
b. To get ready to escape
c. To visit her parents
d. To contact Jacob

You have just engaged in a learning strategy called summarizing. If you are like most students in a study by Doctorow, Wittrock, and Marks (1978, p. 111), you were better able to answer comprehension questions like the preceding one if you had been asked to generate a summary during learning than if you had been asked to reread the paragraph. In this chapter, we examine the idea that generating a summary during learning can be an effective way to promote generative learning.
WHAT IS LEARNING BY SUMMARIZING?

Summarizing occurs when learners restate the main ideas of a lesson in their own words. Summarizing is often used as a strategy to help learners comprehend text-based materials, such as a passage in a textbook. It can also be used for lessons in which words are presented orally (such as in a lecture) or for lessons in which both words and pictures are presented (such as a slideshow, narrated animation, or printed text with illustrations). The unit to be summarized can range from short (e.g., each slide in a slideshow, each segment of a narrated animation, or each paragraph in a chapter) to long (e.g., an entire slideshow, narrated animation, or chapter), and the summaries that students generate can range in length from a sentence or a heading to a paragraph. Although there are many forms of summarizing, the defining feature of a summary is that it is a shorter statement of the main points of a lesson.

As noted by Pressley and colleagues (1989, p. 5), summarizing refers to a “family of strategies” that can be used by students and teachers in several different ways. In this chapter, we focus on learning by generating verbal summaries, such as by stating the main ideas of a lesson as headings, sentences, or paragraphs. Summaries can also be represented spatially, such as by drawing a picture or by creating a knowledge map of the material. We discuss research related to learning by mapping in Chapter 3 and learning by drawing in Chapter 4. In this chapter, we focus on the effects of generating summaries during learning (i.e., when the learner has access to the learning materials) rather than after learning (i.e., when the learner no longer has access to the learning materials). Activities that occur after learning are testing events, which themselves can provide important learning benefits. We discuss research related to the benefits of self-testing in Chapter 6. Finally, summarizing has often been used as an assessment of reading comprehension; however, we focus on how the act of summarizing while studying can serve as a learning tool. In the remainder of this chapter, we present the theoretical and empirical rationale for learning by summarizing, followed by a discussion of boundary conditions and applications to educational practice.

HOW DOES SUMMARIZING FOSTER LEARNING?

Early research on text processing has indicated that learner-generated summaries represent reliable indicators of the types of cognitive processes that occur during reading (Brown & Day, 1983; Brown, Smiley, & Lawton, 1978).
In fact, according to W. Kintsch and van Dijk’s (1978) model of text processing, comprehension largely depends on the learner’s ability to engage in summarizing processes. For example, readers must be able to mentally delete irrelevant or redundant information, substitute fine details for more general statements, and finally, construct the general meaning, or “gist,” of the material (E. Kintsch, 1990; W. Kintsch & van Dijk, 1978). Therefore, when learners generate summaries, they are more likely to engage in these essential cognitive processes and consequently are more likely to construct deeper meaning from the text. In short, the purpose of learner-generated summaries is to promote the cognitive processing necessary for achieving meaningful learning.

Similarly, according to the generative theory of learning (Wittrock, 1974, 1989), summarizing is an effective learning strategy because it forces learners to engage in generative processing – that is, learners are required to extract the main ideas from a lesson, make associations between related ideas, and make associations between the newly acquired information and knowledge already stored in memory. Therefore, the model of generative learning predicts that learning will be enhanced to the extent that learner-generated summaries tap into each of these processes. In other words, students will learn more deeply if they are able to effectively select main ideas, organize them, and then restate them in their own words. On the other hand, students unable to perform these tasks are not expected to benefit from employing summarization strategies. For example, younger students have much more difficulty identifying main ideas in text passages than older students (Brown, Smiley, & Lawton, 1978; Brown & Campione, 1979; Brown & Day, 1983; Brown & Smiley, 1978; Garner, 1982). Further, students who simply copy main ideas verbatim from a lesson understand less than those able to restate the main ideas in their own words (e.g., Brown & Day, 1983). In short, the theoretical goal is that learners use summarizing as a means to promote generative processing but they may need guidance.

According to the cognitive theory of multimedia learning (Mayer, 2009, 2014), summarizing serves to prime the cognitive processes of selecting, organizing, and integrating, as shown in Table 2.1. Selecting involves choosing which elements of information are most important to include in the summary. Organizing involves constructing a concise representation of the selected material by relating the elements of information to each other. Integrating involves using prior knowledge to put the summary into the learner’s own words. Thus, the cognitive benefits of summarizing depend on learners constructing a concise representation of the key points from a lesson that makes use of their existing knowledge.
WHAT IS THE EVIDENCE FOR SUMMARIZING?

Table 2.2 presents the effect sizes of thirty experimental comparisons testing the effects of learning by summarizing. These experiments directly compared the learning outcomes of students who were asked to generate summaries as they learned (the summarizing group) against students who studied the same material using more passive strategies such as normal studying or rereading (the control group). Studies that did not measure learning outcomes, examined more general note-taking strategies, did not include a control group, or did not include sufficient statistics to calculate effect size were not included in this analysis. The analysis reveals positive effects of summarizing for twenty-six of thirty tests, yielding a median effect size of $d = 0.50$. Overall, there appears to be evidence for the benefits of generating summaries during learning, although its effects may depend on the prior knowledge of the learners and the nature of the learning materials.

Core Evidence for Learning by Summarizing

In a classic experiment by Doctorow, Wittrock, and Marks (1978), low- and high-ability sixth graders were given a narrative text and either asked to read the passage normally or to write one-sentence summaries in a blank space above each paragraph. The results showed that those who wrote summaries for each paragraph understood the story much better than those who read the story normally, as indicated by performance on a subsequent comprehension test. Further, this effect was even larger for low-ability readers ($d = 1.58$) than for high-ability readers ($d = 0.99$), suggesting that instructions to generate paragraph summaries may be especially helpful to students who otherwise have difficulty selecting main ideas from text.
<table>
<thead>
<tr>
<th>Citation</th>
<th>Population</th>
<th>Subject</th>
<th>Outcome</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctorow, Wittrock, &amp; Marks (1978), low-ability students</td>
<td>Middle school</td>
<td>Narrative text</td>
<td>Comprehension</td>
<td>1.58</td>
</tr>
<tr>
<td>Doctorow, Wittrock, &amp; Marks (1978), high-ability students</td>
<td>Middle school</td>
<td>Narrative text</td>
<td>Comprehension</td>
<td>0.99</td>
</tr>
<tr>
<td>Bretzing &amp; Kulhary (1979), immediate test</td>
<td>High school</td>
<td>Imaginary African tribe</td>
<td>Comprehension</td>
<td>0.50</td>
</tr>
<tr>
<td>Bretzing &amp; Kulhary (1979), delayed test</td>
<td>High school</td>
<td>Imaginary African tribe</td>
<td>Comprehension</td>
<td>0.46</td>
</tr>
<tr>
<td>Alesandrini (1981)</td>
<td>College</td>
<td>Electrochemistry</td>
<td>Comprehension</td>
<td>0.23</td>
</tr>
<tr>
<td>Annis (1985), low-ability students</td>
<td>College</td>
<td>History</td>
<td>Comprehension</td>
<td>0.40</td>
</tr>
<tr>
<td>Annis (1985), high-ability students</td>
<td>College</td>
<td>History</td>
<td>Comprehension</td>
<td>0.30</td>
</tr>
<tr>
<td>Annis (1985), low-ability students</td>
<td>College</td>
<td>History</td>
<td>Transfer</td>
<td>-0.85</td>
</tr>
<tr>
<td>Annis (1985), high-ability students</td>
<td>College</td>
<td>History</td>
<td>Transfer</td>
<td>-1.58</td>
</tr>
<tr>
<td>Spurlin et al. (1988), frequent summaries</td>
<td>College</td>
<td>Plate tectonics</td>
<td>Recall</td>
<td>0.21</td>
</tr>
<tr>
<td>Spurlin et al. (1988), infrequent summaries</td>
<td>College</td>
<td>Plate tectonics</td>
<td>Recall</td>
<td>0.86</td>
</tr>
<tr>
<td>Wittrock &amp; Alesandrini (1990)</td>
<td>College</td>
<td>Marine life</td>
<td>Recall</td>
<td>0.87</td>
</tr>
<tr>
<td>Hooper, Sales, &amp; Rysavy (1994)</td>
<td>College</td>
<td>Marine life</td>
<td>Recall</td>
<td>0.26</td>
</tr>
<tr>
<td>Foos (1995), one summary</td>
<td>College</td>
<td>Blue shark</td>
<td>Recall</td>
<td>0.42</td>
</tr>
<tr>
<td>Foos (1995), two summaries</td>
<td>College</td>
<td>Blue shark</td>
<td>Recall</td>
<td>0.08</td>
</tr>
<tr>
<td>Study</td>
<td>Education Level</td>
<td>Subject</td>
<td>Task Type</td>
<td>Score</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Leopold &amp; Leutner (2012)</td>
<td>High school</td>
<td>Chemistry</td>
<td>Comprehension</td>
<td>−0.40</td>
</tr>
<tr>
<td>Leopold &amp; Leutner (2012)</td>
<td>High school</td>
<td>Chemistry</td>
<td>Transfer</td>
<td>−0.39</td>
</tr>
<tr>
<td>Bean &amp; Steenwyk (1984), rule-governed training</td>
<td>Middle school</td>
<td>Prose passages</td>
<td>Comprehension</td>
<td>1.27</td>
</tr>
<tr>
<td>Bean &amp; Steenwyk (1984), intuitive training</td>
<td>Middle school</td>
<td>Prose passage</td>
<td>Comprehension</td>
<td>0.71</td>
</tr>
<tr>
<td>King, Biggs, &amp; Lipsky (1984)</td>
<td>College</td>
<td>History</td>
<td>Recall</td>
<td>1.97</td>
</tr>
<tr>
<td>King, Biggs, &amp; Lipsky (1984)</td>
<td>College</td>
<td>History</td>
<td>Comprehension</td>
<td>1.22</td>
</tr>
<tr>
<td>Taylor &amp; Beach (1984)</td>
<td>Middle school</td>
<td>Social studies</td>
<td>Recall</td>
<td>0.82</td>
</tr>
<tr>
<td>Taylor &amp; Beach (1984)</td>
<td>Middle school</td>
<td>Social studies</td>
<td>Comprehension</td>
<td>1.09</td>
</tr>
<tr>
<td>Taylor &amp; Beach (1984)</td>
<td>Middle school</td>
<td>Social studies</td>
<td>Transfer</td>
<td>0.72</td>
</tr>
<tr>
<td>Rinehart, Stahl, &amp; Erickson (1986), major information</td>
<td>Middle school</td>
<td>Social studies</td>
<td>Recall</td>
<td>0.62</td>
</tr>
<tr>
<td>Rinehart, Stahl, &amp; Erickson (1986), minor information</td>
<td>Middle school</td>
<td>Social studies</td>
<td>Recall</td>
<td>0.35</td>
</tr>
<tr>
<td>King (1992), immediate test</td>
<td>College</td>
<td>Social studies (lecture)</td>
<td>Comprehension</td>
<td>1.37</td>
</tr>
<tr>
<td>King (1992), delayed test</td>
<td>College</td>
<td>Social studies (lecture)</td>
<td>Comprehension</td>
<td>0.48</td>
</tr>
<tr>
<td>Cordero-Ponce (2000), immediate test</td>
<td>College</td>
<td>Foreign language</td>
<td>Recall</td>
<td>0.77</td>
</tr>
<tr>
<td>Cordero-Ponce (2000), delayed test</td>
<td>College</td>
<td>Foreign language</td>
<td>Recall</td>
<td>0.41</td>
</tr>
<tr>
<td>MEDIAN</td>
<td></td>
<td></td>
<td></td>
<td>0.50</td>
</tr>
</tbody>
</table>
In a study by Bretzing and Kulhavy (1979), high school students read a passage describing an imaginary African tribe; some students were asked to write a short summary of each page of text (the summarizing group), whereas others did not receive instructions to summarize (the control group). After reading the text, students took immediate and delayed comprehension tests based on the passage. Results indicated that the summarizing group significantly outperformed the control group on both tests (immediate: $d = 0.50$; delayed: $d = 0.46$). The summarizing group also outperformed a group asked to take verbatim notes of the passage and performed similarly to a group asked to paraphrase the passage.

In a study by Alesandrini (1981), college students read a lesson about the electrochemistry of a battery with instructions either to generate summaries after the presentation of each concept (the summarizing group) or to read about each concept twice (the control group). In addition, some students received more specific summarizing instructions to focus on how each concept relates to the overall workings of a battery (the holistic group) or to focus on specific attributes and characteristics of each battery component (the analytic group). The results indicated that the summarizing group (who received generic summary instructions) did not significantly outperform the control group on a subsequent comprehension test ($d = 0.15$). Students also did not significantly benefit from specific instructions to generate holistic ($d = 0.35$) or analytic ($d = 0.19$) summaries. Overall, the average effect size across the three summary groups was $d = 0.23$. One explanation for this finding is that generating summaries is not as effective when learning from text that describes complex spatial relations. Instead, drawing a picture to represent the text may be more appropriate. Indeed, other students in the study by Alesandrini who were given instructions to generate drawings (either general instructions or instructions to generate holistic or analytic drawings) generally performed better than those who generated verbal summaries.

In a study by Annis (1985), college students read a text-based history lesson either normally (the control group) or while generating paragraph summaries (the summarizing group). One week later, both groups were given a test on the material, which contained items targeting each of the levels of Bloom’s taxonomy (i.e., knowledge, comprehension, application, analysis, synthesis, and evaluation). Results indicated that generating paragraph summaries was most effective at the application level (low-ability students: $d = 0.72$; high-ability students: $d = 0.61$) and generally effective across the knowledge, comprehension, and application levels, which we combined to form a single measure of comprehension (average $d = 0.40$ for low-ability
students; average $d = 0.30$ for high-ability students). However, generating paragraph summaries was highly ineffective at the higher levels of synthesis and evaluation (average $d = -0.85$ for low-ability students; average $d = -1.58$ for high-ability students). Overall, this study suggests that while summarizing appears to benefit general understanding of a text, it may not be sufficient to prime deep creative thinking.

In a study by Spurlin and colleagues (1988), college students studied a geology text on plate tectonics with instructions to summarize four times at different points throughout the passage (the frequent summary group) or to summarize two times throughout the passage (the infrequent summary group), or they received no instructions to summarize. On a subsequent delayed recall test, infrequent summarizers significantly outperformed the control group ($d = 0.86$); however, frequent summarizers did not significantly outperform the control group ($d = 0.21$). One possible explanation for this finding is that students expend more effort when they are asked to summarize relatively infrequently as opposed to frequently.

Wittrock and Alesandrini (1990) tested whether the effects of generating paragraph summaries hold when students in the control condition are asked to reread each paragraph (rather than read the material only once). In the experiment, college students were given instructions to read a text about marine life and generate paragraph summaries (the summarizing group) or read and reread the text (the control group). Results indicated that the summarizing group outperformed the control group on a subsequent completion test ($d = 0.87$), which only required learners to recall information presented in the text. Thus, one limitation of this study is that it did not include a measure of deep learning, such as comprehension or transfer.

Hooper, Sales, and Rysavy (1994) attempted to replicate the findings of Wittrock and Alesandrini (1990). However, the summarizing group did not significantly outperform the control group on the final completion test ($d = 0.26$). Closer examination of the data indicated that students struggled to generate accurate summaries during learning. This suggests that some students may need explicit instruction in how to generate quality summaries.

In a study by Foos (1995), college students read a text passage about blue sharks with instructions to write one summary or two summaries (i.e., one for each half of the text) of the passage, or without instructions to summarize (the control group). All groups then completed a recall test of the material consisting of multiple-choice and fill-in-the-blank questions. Results indicated that students who generated one summary significantly outperformed the control group ($d = 0.42$); however, students who generated two
summaries did not significantly outperform the control group \((d = 0.08)\). This study provides support for the idea that students may benefit from less frequent summarizing, possibly because students invest more effort to generate one summary than to generate multiple summaries.

Recent research by Leopold and colleagues (Leopold & Leutner, 2012; Leopold, Sumfleth, & Leutner, 2013) further demonstrates the limitations identified by Alesandrini (1981) of generating verbal summaries when learning from science texts that describe spatial relations. In one experiment by Leopold and Leutner (2012), high school students studied a science text about water molecules with instructions to generate paragraph summaries (the summarizing group) or no instructions to use a learning strategy (the control group). Results indicated the summarizing group performed significantly worse on subsequent comprehension \((d = -0.40)\) and transfer \((d = -0.39)\) tests than the control group. A follow-up study by Leopold, Sumfleth, and Leutner (2013) found similar negative effects of generating summaries on science understanding.

Importantly, in both studies by Leopold and colleagues, generating pictorial summaries (i.e., drawings) was more effective than generating verbal summaries or not generating a summary. This suggests that when learning material that contains complex spatial relations (such as components of water molecules), it may be more appropriate for students to generate a spatial representation of the material, such as by drawing a picture. The effects of learning by drawing are discussed more fully in Chapter 4.

**Summarization Training**

As mentioned previously, the effects of summarizing as a learning strategy depend on whether learners are able to generate quality summaries (also see Bednall & Kehoe, 2011; Garner, 1982). For some learners, explicit summarization training may be necessary. Although some studies have focused on the effects of summarization training on the quality of learners’ summaries (e.g., Friend, 2001; Hare & Borchard, 1984), in this section we focus on whether summarization training improves students’ ability to recall and comprehend new materials.

In a study by Bean and Steenwyk (1984), middle school students were provided with extensive training on how to use one of two summarization strategies. Some students were trained on how to use a rule-governed approach, whereas others were trained on how to use a more intuitive approach. The rule-governed training consisted of instruction and practice exercises using six rules for summarizing text: (1) delete unnecessary
material, (2) delete redundant material, (3) compose a word to replace a list of items, (4) compose a word to replace the individual parts of an action, (5) select a topic sentence, and (6) invent a topic sentence if one is not available. On the other hand, those trained to use the more intuitive approach received instruction and completed practice exercises on how to create summaries of sentences and paragraphs. Students began by composing summaries of individual sentences and progressed until they could create summaries of entire paragraphs. A control group received the same amount of practice as the two training groups but was not provided with explicit instruction on how to summarize; instead, these students were simply told to write summaries by finding the main ideas of the lesson. The results indicated that both the rule-governed and intuitive summarization training groups performed better than the control group on a subsequent standardized test of paragraph comprehension, yielding effect sizes of $d = 1.27$ and $d = 0.71$, respectively. This study suggests that explicitly training students how to summarize a text can produce large gains in comprehension.

King, Biggs, and Lipsky (1984) trained college students how to use a rule-based summarization approach similar to that of Bean and Steenwyk (1984). The training consisted of whole-class instruction and practice in using each of the six summarization rules, followed by small-group activities, during which students had the opportunity to compare the summaries they generated to those generated by their peers. A control group completed the same practice exercises and group activities using their normal note-taking strategies, but without any direct training in how to use the summarization rules. All students then read a text-based history lesson and either applied the summarizing strategies they learned or took notes normally. Results indicated that students who were given direct instruction on how to summarize performed much better than the control group on two measures of recall (average $d = 1.97$) and an essay test targeting comprehension ($d = 1.22$).

In a study by Taylor and Beach (1984), middle school students received seven weeks of training and practice generating hierarchical summaries of social studies texts (the summarizing group). Hierarchical summaries, similar to outlines, contain numbered headings and subheadings intended to organize the main ideas and supporting details from a text. Other students did not receive strategy instruction (the control group). During the eighth week, both groups read either a familiar or unfamiliar passage while applying their respective training. The summarizing group generated a hierarchical summary of the passage, whereas the control group reread the passage. Then both groups completed a recall test and a short-answer comprehension test on the passage, and one week later, they completed a
writing post-test in which they were asked to write an opinion essay about their favorite season. Results indicated that the summarizing group outperformed the control group on the recall test ($d = 0.82$) and the comprehension test ($d = 1.09$). Further, students receiving summarization training were able to transfer their acquired skills to producing better-quality essays than students in the control group ($d = 0.72$).

The study by Taylor and Beach (1984) provides strong support that students who are trained on how to generate summaries learn better than those who receive no special strategy instruction. However, it is important to note that a third group was also included in the study that received seven weeks of conventional instruction involving reading and answering practice questions on the same social studies texts (the conventional group). Comparison between the summarizing group and conventional group indicates much more modest benefits of summarization training. In particular, the summarizing group significantly outperformed the conventional group on recall of the unfamiliar passage; however, there were no other differences between the two groups on the recall, short-answer, and writing tests.

In a study by Rinehart, Stahl, and Erickson (1986), sixth grade students received five sessions of training on how to generate summaries based on rules similar to those identified by Bean and Steenwyk (1984). The training followed five primary principles of direct instruction: (1) providing explicit explanation, (2) modeling, (3) practicing with feedback, (4) breaking down complex skills, and (5) using scripted lessons. A control group received normal reading instruction, which involved completing readings and worksheets from basal readers. On a subsequent test that involved reading and recalling a chapter from a social studies textbook, students who received summarization training were significantly better able to recall major information ($d = 0.62$), but not minor information ($d = 0.35$), compared to the control group. Thus, summarizing instruction helps learners recall the main ideas from a text but may not be effective in helping learners recall minor details from a text.

Does summarization training help students comprehend material from lectures? In a study by King (1992), college students were provided direct explanations, cognitive modeling, and scaffolded practice on how to “generate summaries of the lectures by linking ideas from the lecture together and using only their own words” (p. 310). The instructor also explained the benefits of summarizing as a learning strategy, including its usefulness for effective self-regulation and for enhanced encoding and recall of material. A control condition did not receive strategy instruction but took notes normally during the practice exercises. During testing, both
conditions took notes while watching a videotaped social studies lecture. The training condition summarized their notes afterward, whereas the control condition only reviewed their notes. The results showed that students who were trained to summarize their notes performed better on both immediate \((d = 1.37)\) and delayed \((d = 0.48)\) comprehension tests than those who only reviewed their notes.

In a study by Cordero-Ponce (2000), college students learning a foreign language were trained in how to summarize French texts. Training was provided during two hour-long sessions presented on consecutive days, and consisted of direct instruction on summarization rules that progressed from how to summarize simple English texts to how to summarize French texts. A control group did not receive summarization training. On subsequent immediate and delayed post-tests, both groups were asked to read French passages and recall them in English. Results indicated that students who received summarization training performed significantly better than the control group on both the immediate tests \((d = 0.77)\), but the effects did not reach statistical significance for the delayed \((d = 0.41)\) tests. However, this may have been due to the study having a relatively small sample size.

Overall, the preliminary findings reviewed in this section suggest that pretraining in summarization techniques can be helpful.

WHAT ARE THE BOUNDARY CONDITIONS FOR SUMMARIZING?

Research on learning by summarizing provides important boundary conditions for its utility as a generative learning strategy. For example, summarizing appears to be most effective for relatively short expository texts (such as a passage about an historical event). Summarizing may not be effective when the material involves information that is highly spatial in nature, such as science concepts related to physics or chemistry. There is also some evidence that summarizing material relatively infrequently (such as one time after reading a short passage) may be more effective than generating frequent summaries (such as generating summaries four different times while reading a short passage). However, there is some evidence that frequent summarizing is effective, particularly when the summaries are short (such as generating one-sentence paragraph summaries).

One potential drawback of summarizing is that learners may need explicit training in how to generate quality summaries. Some learners may not be able to identify main ideas from a text successfully and restate them concisely by connecting the ideas with their existing knowledge. Instead, they may simply resort to copying notes verbatim from a lesson, which
Learning as a Generative Activity

does not involve generative processing and does not result in deep learning. Summarization training programs can be effective; however, they can also be time consuming, and it is at this point unclear how training in summarizing compares to other forms of instruction aimed at enhancing reading comprehension.

**How Can We Apply Summarizing?**

Summarizing can be applied to learning from short text–based lessons that do not contain highly spatial content. For example, summaries may be more appropriate for learning from narrative or historical texts rather than scientific texts. Summarizing can also be applied as a note-taking strategy for learning from lecture-based instruction or from narrated animations; however, much less research has been conducted on the effects of summarizing lessons that are not text-based.

Although summarizing is a relatively simple learning strategy to implement, students across grade levels would likely benefit from first receiving direct instruction in basic techniques of summarizing. Students may need practice in identifying relevant elements of information from a lesson, fitting related elements together into a coherent structure, and articulating the material concisely in their own words. Once students have developed this set of competencies, teachers can easily integrate summarizing within classroom instruction, and students can employ summarizing within their repertoire of study strategies.

This chapter focused on the effects of summarizing while learners have access to the learning materials. Other studies have considered the effects of not allowing learners to refer back to the materials while summarizing (e.g., Coleman, Brown, & Rivkin, 1997; Dyer, Riley, & Yekovich, 1979; Ross & Di Vesta, 1976; Stein & Kirby, 1992). This relies not only on the ability effectively summarize but on the ability to retrieve the material from memory. The existing research does not provide a clear answer as to which approach is more effective (Dunlosky et al., 2013), but the effects likely depend on how well learners initially process the material and how well learners are able to generate quality summaries that involve using their own words. As is discussed in Chapter 6 on the effects of learning by self-testing, if learners are not able to retrieve material from memory successfully, it is important that they receive some form of corrective feedback. Thus, in the case of summarizing when the learning materials are not present, students may benefit from being able to refer back to the material after generating their summary.
CONCLUSION

Overall, the literature provides support for generating summaries when a few key conditions are met. First, learners must possess the requisite prior knowledge to effectively select main ideas, make connections among them, and restate them in their own words. Research has shown that young children are often unable to select main ideas from a text; however, even college students can have difficulty constructing quality summaries. In these situations, more direct summarization training may help overcome these deficits.

Summarizing in words may be most beneficial for content areas that are not inherently spatial in nature, such as areas within the social sciences and humanities, as well as narratives. Subjects that are more spatial in nature, such as chemistry, may not be best represented in the form of a verbal summary, but rather a spatial representation (such as a drawing) may be more appropriate. In short, the effectiveness of generating summaries appears to depend largely on learners’ prior knowledge and the subject area of the lesson to be learned.

REFERENCES


