INTRODUCTION
The aim of this chapter is to examine the current evidence concerning how students can maximize their study strategies to learn more effectively and how teachers can facilitate this use of study strategies. Our examination of strategic studying explores ways in which studying and strategic processing have been viewed in the past, the theoretical frameworks that have been used to examine this issue, assumptions of current research trends in this area, and, finally, what this research means for educational practice.

First, we want to frame what studying is. As Winne and Hadwin (1998) pointed out, “studying is a fuzzy task” (p. 277). Conceptions of what studying is vary widely and include something that is roughly synonymous with learning (e.g., Dunlosky & McNamara, 1997), self-regulated learning (e.g., Winne & Hadwin, 1998), and test preparation (Abd-El-Fattah, 2011). We define studying as independent cognitive or behavioral engagement initiated to learn for an upcoming task such as a test or a performance (Nolen, 1988; Thomas & Rothenberg, 1986; Winne & Hadwin, 1998). Typically these tasks are goal oriented (e.g., towards an activity such as a test), either set by the teacher or student (Winne & Hadwin, 1998). For example, students might read an assigned text for an upcoming class or quiz, or practice for an on-road driving examination. While studying has often been tied very closely to metacognition and self-regulation (e.g., Winne & Hadwin, 1998), this chapter will focus more specifically on strategy use, as metacognition and self-regulation are discussed more extensively elsewhere in this Handbook (Chapter 11, this volume). Further, this chapter will focus primarily on the cognitive activities that occur during studying, as opposed to affective or motivational factors that drive or arise from the process of studying. These affective and motivational factors are described elsewhere in this Handbook (Chapter 12, this volume). Finally, we note that this chapter focuses on studying, rather than the larger set of strategies that are typically encompassed under research that examines learning strategies.

Further, we need to frame what we mean by studying strategically. Actions undertaken in pursuit of learning for a specific goal or task may be skillful, strategic, or neither skillful nor strategic. According to Alexander, Graham, and Harris (1998) being strategic implies that the actions are “procedural, purposeful, effortful, willful,
essential, and facilitative” (p. 130). On the other hand, skillful behaviors are “procedures that have been routinized” (p. 135). Of course, one could initiate actions that are neither skillful nor strategic. For example, one could read aloud an entire text without employing any strategic behavior such as rereading or making inferences about the text. Thus, the focus for this chapter is how students can maximize what they learn during study by utilizing strategic processes and actions.

**HISTORICAL OVERVIEW**

Given that we are attempting to elucidate ways in which students can leverage strategic performance to improve studying and learning, we first provide a historical account of these issues as they have been discussed in the scientific literature. Since the depth and breadth of research on studying and strategic processing is vast, we have chosen to focus on four perspectives of studying and strategic processing that may help uncover how past perspectives inform current research in these areas. These perspectives are: Marton & Säljö’s (1976a, 1976b) Qualitative Differences in Learning, Vermunt and colleagues’ Patterns of Adaptive Learning (e.g., Vermunt, 1996; Vermunt & Vermetten, 2004), Alexander’s Model of Domain Learning (1997, 2004), and Winne and Hadwin’s Study Tactics (1998).

*Qualitative Differences in Learning (Marton & Säljö)*

In one of the earliest theoretical articulations of approaches to studying, Marton and Säljö (1976a) investigated qualitative differences in learning outcomes by examining the approaches that students took as they studied texts. Using mostly semi-structured interviews, they identified two different levels of learner engagement, surface-level and deep-level processing. Specifically, these approaches referenced the aspects of the to-be-learned material upon which learners focused their attention. Surface-level approaches aligned with a reproductive conception of learning, in which students focused on mentally replicating the text or study materials as they studied. In contrast, those students engaged in deep-level processes sought to understand the intended meaning of the text or study materials, including the intentions of a text’s author. Marton and Säljö (1976a) theorized that surface- and deep-level processing were two distinct levels that were clearly distinguishable and relatively stable within individuals. Moreover, they found that students who used a deep-processing approach when reading had better summary and recall of the text than students who used a surface-processing approach. Their expansion of this initial framework (Marton and Säljö, 1976b) examined whether or not the type of assessment could induce these approaches. Indeed, a surface-level approach was induced by assessments requiring recall of specific points from a text, while a deep-level approach was induced when readers were asked to state the main points of the text. Hence, in addition to a degree of stability within individuals, their findings suggest that these approaches may change depending on environmental conditions (i.e., the nature of the outcome task). However, as evidenced by the next perspective, researchers and educators have frequently focused on the first of Marton and Säljö’s (1976a) findings, seeking to characterize stable approaches to studying within individuals.

*Patterns of Adaptive Learning (Vermunt and colleagues)*

Following the work of Marton and Säljö, and others (e.g., Biggs, 1978), Vermunt and colleagues sought to identify styles of learning that typified student approaches to
learning and studying (Vermunt, 1996, 1998). The four approaches identified were: undirected, reproduction directed, meaning directed, and application directed learning styles (Vermunt, 1996). Later, Vermunt and colleagues changed the terminology of learning styles to Patterns of Adaptive Learning (PAL; e.g., Vermunt & Vermetten, 2004). This change in terminology helps distinguish Vermunt and colleagues’ conceptions of Patterns of Adaptive Learning from the American conception of learning styles (e.g., visual learner), which has been widely discredited (Pashler, McDaniel, Rohrer, & Bjork, 2008).

Each of these four approaches was assumed to be relatively stable within individuals (i.e., trait-like), and therefore are typically measured using self-report questionnaires. From a cognitive perspective, students who are undirected tend not to monitor their learning or studying and tend to rely on relatively surface-level strategies, such as rereading or highlighting. These students are not able to synthesize study materials and tend to put equal weight on all learning materials, regardless of their actual utility or relevance. Reproduction-directed students select study materials based on the frequency of occurrence of each topic as well as the directions of an external source (e.g., teacher, tutor), and also typically engage in mainly surface-level strategies. For the meaning-directed learner, points of study are selected based on intrinsic interests. Cognitive emphasis is put on synthesizing materials rather than studying the specific details of each text or study material. Additionally, these students use deeper-level strategies such as interpreting and elaborating on the material being studied. Finally, application-directed students study in ways to concretize information rather than rely on synthesis or abstraction. These students rely on deep-level strategies that connect their studying with their personal experiences and goals in practical ways.

Based on these different characteristics of learners, Vermunt and Vermetten (2004) identified three main types of cognitive processing strategies: deep processing (e.g., relating, structuring), stepwise processing (e.g., analyzing and memorizing), and concrete processing (e.g., concretizing and applying). In order to identify which of these strategies, if any, students utilize while studying, measures such as the Learning and Study Strategies Inventory (LASSI; Weinstein, Zimmermann, & Palmer, 1988) and the Approaches and Study Skills Inventory (ASSIST; Tait, Entwhistle, & McCune, 1998) have been employed by researchers using the PALS framework. The LASSI is a 90-item inventory containing 10 subscales such as information processing (“I try to find relationships between what I am learning and what I already know”), self-testing (“I seldom review except just before tests”), and study aids (“I make simple charts, diagrams, or tables to summarize material in my courses”; Weinstein et al., 1988, pp. 36–39). The LASSI is typically administered as a single measure, although the subscales are typically analyzed separately. The ASSIST measures the degree to which students utilize each of three approaches to studying: deep (e.g., relating ideas), surface (e.g., unrelated memorizing, fear of failure), and strategic (e.g., time management, organized studying). Several subscores are calculated for each of the three approaches. Students receive a score for each approach, although sometimes this measure is used to classify students according to their most strongly endorsed approach (e.g., Buckley et al., 2010).

Each of these qualitatively different learning styles have been found in samples of students, even when they are exposed to the same external factors (e.g., similar or the same instruction; Vermetten, Vermunt, & Lodewijks, 2002). However, these styles may change if students experience discord between their current style and the demands of the learning context (Vermunt & Verloop, 1999). This can occur in the form of
constructive friction, which stimulates students to use new, helpful strategies, or destructive friction, which decreases strategic use (e.g., someone else regulating a task for them; Vermunt & Verloop, 1999).


Alexander’s Model of Domain Learning (MDL) is a developmental model of expertise that can serve as a useful frame when examining strategic studying. The MDL posits that learning is domain dependent (i.e., cognitive processes employed in one academic domain may not be employed in another academic domain), and that strategic processing interplays with knowledge and interest across an individual’s development within a domain (Alexander, 1997; Alexander & Grossnickle, 2016). Unlike the previous two frameworks, this model assumes that strategic processing is context-specific. In other words, the same individual might manifest different types of strategies (e.g., mostly deep-level versus mostly surface-level) across different domains of learning (e.g., mathematics versus biology). Additionally, in contrast to the other models, the MDL does not presume that strategies occur in isolation, rather that they work in concert with knowledge and interest.

In terms of strategic processing, the MDL hypothesizes two types: surface-level and deep-level processing. Surface-level processing is the use of strategic behavior related to basic encoding of the textual content (Alexander, Sperl, Buehl, Fives, & Chiu, 2004; Nolen & Haladyna, 1990), such as rereading or rehearsing part of text to memorize what an author said. Deep-level processing, on the other hand, utilizes strategies to more extensively manipulate or transform a task or text (Alexander et al., 2004; Nolen & Haladyna, 1990). For example, using one’s prior knowledge to elaborate on an idea while reading a text would be a deep-level strategy.

Measures of study strategies employed by investigations using the MDL framework have typically used strategy checklists and think-aloud protocols to uncover surface- and deep-level strategies used during text-based learning. Strategy checklists, which can be administered to participants before or after reading a text, provide students with a prepopulated list of strategies, and students are asked to mark the ones they used and the ones that were most helpful (Murphy & Alexander, 2002). Think-alouds typically occur during reading and require a reader to verbalize any internal thoughts (e.g., “tell me what you are thinking”). Think-aloud transcripts are then coded for evidence of strategies that the researcher has determined to be surface- or deep-level (Dinsmore & Alexander, 2015; Pressley & Afflerbach, 1995).

In addition to these strategies being more state-like within the MDL framework, strategic processing is also described as developing as students progress toward expertise. Specifically, the MDL posits three stages along the development of expertise: acclimation, competence, and proficiency-expertise. In terms of strategic processing, at acclimation students rely primarily on surface-level strategies (Alexander, 1997, 2004). As they progress through the stages, their reliance on surface-level strategies decreases and their ability to utilize deep-level strategies increases until they reach proficiency, where they rely primarily on deep-level strategies.

**Study Tactics**

Central to Winne and Hadwin’s (1998) conceptualization of study tactics is that studying represents a “complex, self-regulated learning event” (p. 278) that produces recognizable
traces or behaviors (Winne et al., 2006). Similar to models depicting self-regulated learning as a cyclical process representing forethought, performance, and reflection (Zimmerman, 1990), Winne and Hadwin (1998) propose that studying follows a recursive and adaptive process. Within this model, studying begins with defining the perceived task (stage 1), then setting goals and planning for the study session (stage 2).

Following the formulation of goals, study tactics (stage 3) are enacted. Study tactics as defined by Winne and Hadwin resemble the collection of strategies described by Marton and Säljö (1976a, 1976b), Vermunt and colleagues (Vermunt, 1996; Vermunt & Vermetten, 2004), and Alexander (2004). However, rather than focus on the classification of strategies as deep or surface in nature, Winne and Hadwin emphasize the need to align strategies to the task and to use multiple strategies in concert (i.e., to bundle strategies; Hadwin, Winne, Stockley, Nesbit, & Woszczya, 2001). When considering typical studying strategies without instructor intervention, what Winne and Hadwin (1998) refer to as “normal” studying, study tactics are applied relatively infrequently and ineffectively. Although there has been considerable research on the most effective strategies for tasks such as retaining course material for tests (Dunlosky et al., 2013), the application of effective study tactics frequently results only from intervention or training (Winne et al., 2006).

For Winne and Hadwin, strategic studying represents the flexible application of each stage of studying, coordinated through the final stage: monitoring and evaluation (stage 4). They regard monitoring and evaluation as a metacognitive act that enables the learner to be adaptive in the application of study tactics and the reformulation of the goals and plans for studying (Winne & Hadwin, 1998). Winne and Hadwin indicate that strategic studying would involve quick and flexible adaptation during the studying event (e.g., while reading chapter 3). Yet, efforts to improve students’ ability to apply appropriate strategies typically report on collections of strategies used throughout the entire studying event (e.g., Graham, Harris, & Mason, 2005). As with investigations framed by the MDL, those applying Winne’s model also tend to use think-aloud protocols as measures of strategy use. In addition, this research also commonly uses log files and computer traces collected during computerized study sessions to record actions and behaviors instead of relying on students’ ability to articulate their strategies (Hadwin et al., 2001; Winne et al., 2006).

Throughout the entire model, internal (e.g., background knowledge, motivation) and external (e.g., resources, time) conditions are regarded as critical for understanding how the studying process unfolds across each of the stages (Winne & Hadwin, 1998). Considerable attention is paid to individual variation in effective studying (Winne, 1996). For example, even if students are given the same assignment or task (e.g., read chapter 3 of their course textbook), they vary greatly in the goals that they set (Winne & Hadwin, 1998). In this example, students might generate goals ranging from visually scanning each of the words in the chapter in order and highlighting important sentences, to summarizing the chapter’s content in their own words or generating questions to bring to class.

THEORETICAL FRAMEWORK

In light of these differing historical traditions that have guided efforts to understand strategic studying, there is a need to bring these divergent perspectives together within a unifying framework. To do so, our examination of the current trends in empirical research uses three themes as our guiding framework: the development of study
strategies, the inclusive/exclusive nature of conceptions of study strategies in relation to study outcomes, and the specific conditions or mechanisms that may improve study outcomes. In examining these three themes, we present two contrasting viewpoints: that of the Cartesian-split-mechanistic tradition (CSMT) and relational systems models (e.g., Overton, 2014). Each of these three themes has gathered increased attention as elements of relational systems models have begun to influence research on motivation (e.g., Kaplan, Katz, & Flum, 2012), metacognition, and self-regulation (e.g., Dinsmore, 2014). Relational models stress intra-individual differences, inclusivity of categories, and multiple notions of causality (Overton, 2014), whereas CSMT stress inter-individual differences, exclusive categories, and linear causality (Overton, 2014). Each of these issues will be discussed in turn as they have the potential to influence investigations of strategic studying.

**Nature of Development**

The first of our guiding themes concerns the focus on intra-individual differences (i.e., differences within an individual over time due to maturation or learning; e.g., Pintrich, Anderman, & Klobucar, 1994) versus a focus on inter-individual differences (i.e., differences across individuals at one point in time; e.g., Weinart & Helmke, 1995). The relational tradition (RT) and its associated models and methods typically favor an examination of intra-individual differences (Nesselroade & Molenaar, 2010). These changes are attributed to dynamic environmental and contextual changes around the individual. Models and methods following the Cartesian-split-mechanistic tradition (CSMT; e.g., randomized control trials) focus more on inter-individual differences. In this tradition, the effects of an intervention may be known, but the contextual and developmental factors associated with that change are not. In contrast, the RT tradition assumes that during the course of development an individual actively participates in that development, that development may be non-linear, and that this development is completely contextualized in a specific time and place (Overton, 2014).

Thus, in describing current trends in study strategies research, it is important to recognize not only how study strategies may vary across individuals, but also how individuals change over time and across contexts. From the historical overview, it appears to us that the primary focus of these models is inter-individual differences. For example, in the PALs framework, the focus is on the differences between each of the four groups (i.e., undirected, reproduction-directed, meaning-directed, and application-directed learners). Additionally, these trait-like groups were not expected to change as a result of time or context (i.e., relatively stable). A counter example is Alexander’s Model of Domain Learning (MDL). In this model, the focus is more directed toward how an individual student changes over time in a specific context (e.g., the academic domain).

**Inclusivity/Exclusivity of Categories**

The second issue concerns how categories are developed—that is, whether strategies are delineated into mutually exclusive categories or whether strategies are allowed to span multiple or overlapping categories. CSMT considers constructs to constitute a whole that are additive, whereas in RT, constructs and the elements of those constructs cannot be meaningfully separated and are not necessarily additive (Overton, 2014). These different approaches tend to create different conceptualizations and operationalizations of a construct. For example, Dinsmore and Alexander’s (2012)
review of deep- and surface-level processing demonstrated that definitions of levels of processing were almost entirely exclusive (a distinct deep-level and a distinct surface-level). Distinctions like these in CSMT would conclude that one is either a deep-level or surface-level processor. Thus, an investigation of deep- and surface-level processing may lead to an analysis that examines deep-level processors versus surface-level processors, typically through an analysis of variance between those two groups. This is consistent with the PALs framework, which posits that the study categories are mutually exclusive (i.e., one could not belong to more than one group) as well as relatively stable.

In contrast, an RT approach would suggest that the actual study strategies utilized by a given student lie on a continuum somewhere between the deep and surface level and that where they lay on the continuum may change as a function of the time, task, and the context in which they are examined. For instance, Dinsmore and Alexander (2015) used the proportion of deep- versus surface-level strategies to describe where individuals fell along a continuum, rather than place them into one category or the other. It is important to note in this example that the strategies themselves were still classified as exclusively deep or surface level, maintaining at least some degree of CSMT.

**Conditions**

The third issue is a consideration of the types of conditions that may influence study strategies and the relation of those study strategies to their outcomes. The conditions posited historically have relied either on individual characteristics (e.g., prior knowledge of the individual) or situational characteristics (e.g., whether the study task is closed or open-ended). For example, in the deep- and surface-level strategy literature there is a heavy emphasis on individual differences (Dinsmore & Alexander, 2012). However, more emphasis on the situational elements that influence study strategies and study outcomes (e.g., the learning environment; Nichols, 1996), as emphasized by relational models, would help explicate the relation between study strategies and study outcomes even further, particularly since evidence has emerged indicating that there is a meaningful interaction between individual and environmental characteristics that may warrant further investigation (e.g., Dinsmore & Alexander, 2015).

**Current Issues and Trends**

We now turn to an examination of recent empirical research in order to understand current trends in strategic studying. The three issues outlined in the previous section are used to frame this examination. Specifically, the following questions guided our review:

1. How has the development of study strategies (i.e., intra- or inter-individual change) been examined?
2. Is the nature of study strategies exclusive (e.g., mutually exclusive categories such as deep and surface level) or inclusive (e.g., some continua between deep and surface level)?
3. What conditions (i.e., personal and situational characteristics) influence the relation between study strategies and study outcomes? In other words, is there evidence that some study strategies work better under certain conditions for certain students?
Systematic Review Procedure

Search Criteria

To examine the recent trends in empirical investigations of study strategies, systematic search criteria were used to identify relevant articles. A search was conducted using the PsycINFO database, with the following search terms: “effective studying,” “study tactics,” “study skills,” and “study strategies.” For the purpose of the chapter, the terms “studying” or “study” were used to find articles that related specifically to the act of studying, rather than the broader construct of learning (see Fiorella & Mayer, 2015, for a review of learning strategies). Since conceptions of what studying is vary widely (Winne & Hadwin, 1998), we relied on researchers’ self-identification of articles using the search terms study or studying, rather than the broader construct of learning that subsumes studying. Articles that featured one or more of these specific search terms in their title or abstract were identified, and the search was narrowed to only those articles that were written in the English language, peer-reviewed, and published since 2010.

This initial search yielded 162 studies for possible inclusion. An initial review revealed that 121 studies did not include a measure of or intervention using study strategies (e.g., Erdamar, 2011), and were therefore not included in the final pool of reviewed studies. The remaining 40 studies formed the final pool, and appear in Table 10.1.

Coding Schemes

Data for the review table were derived either by including a relevant description of the article feature or by using an a priori developed coding scheme. The following features were recorded descriptively: what study strategy or strategies were investigated, the strategy measure used, the relation between the study strategies and study outcomes, and the analysis used to investigate these relations. The following features were coded according to a scheme, which we describe subsequently: strategy specificity; developmental level of the participants; study context; academic domain; nature of development; type of categories used; and outcome measure.

Strategy Specificity

Studies were first coded according to whether the study strategies were a general set of strategies (GEN) or whether specific strategies (SPEC) were investigated. For example, an investigation that used a study strategy inventory (e.g., ASSIST; Tait et al., 1998) to create an aggregated score for a set of study strategies was coded GEN, while an investigation that measured and linked one specific strategy (e.g., elaborating) to a study outcome was coded SPEC (e.g., Einstein, Mullet, Harrison, 2012).

Developmental Level of the Participants

Next, we coded studies for the age group of the participants. We coded participants as pre-kindergarten (PK), elementary school/primary grades (ES), middle school (MS), high school/secondary grades (HS), university undergraduate students (UG), university graduate students (GS), or non-student adults (AD). In cases where multiple developmental levels of participants were used, all were indicated in the column.
<table>
<thead>
<tr>
<th>Citation</th>
<th>Strategy Specificity</th>
<th>Strategy Description</th>
<th>Strategy Measure</th>
<th>Participants</th>
<th>Study Context</th>
<th>Domain</th>
<th>Nature of Development</th>
<th>Category Type</th>
<th>Outcome Measure</th>
<th>Relation of Strategy to Outcome (i.e., Salient Results)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abd-El-Fattah (2011)</td>
<td>GEN</td>
<td>Learning Processes Questionnaire Revised (LPQ-R-2F)</td>
<td>UG SUR SS WS EX AA</td>
<td>Students adjusted their study strategies based on whether they thought they were studying for a test with deep-level vs. surface-level questions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bednall &amp; Kehoe (2011)</td>
<td>SPEC</td>
<td>Elaboration, planning, monitoring, summarization, explanation generation</td>
<td>Prompted UG NAT SS BS EX SR CR</td>
<td>Participants who were prompted to use planning, monitoring, and elaboration applied materials from the reading better than students who were not prompted to use strategies (study 1); students prompted to use explanation generation performed significantly better than students prompted to summarize (study 2); all results only significant for near transfer task (applying examples from text) but not far transfer (novel examples).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bockers et al. (2014)</td>
<td>GEN</td>
<td>ASSIST</td>
<td>GS NAT AS WS EX AA</td>
<td>Strategic approach students had above average scores at posttest; deep approach group showed no significant difference; the surface approach group had lower than average scores at posttest.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buckley et al. (2010)</td>
<td>GEN</td>
<td>ASSIST</td>
<td>UG SUR GEN BS EX SR</td>
<td>Judgments of networked learning positively correlated with deep and strategic approaches, but negatively correlated with a surface approach.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burnett &amp; Bodner (2014)</td>
<td>GEN</td>
<td>MSLQ</td>
<td>UG SUR SS BS EX CR</td>
<td>Use of deep-level strategies was associated with better recall.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citation</td>
<td>Strategy Specificity</td>
<td>Strategy Description</td>
<td>Strategy Measure</td>
<td>Participants</td>
<td>Study Context</td>
<td>Domain Nature of Development</td>
<td>Category Type</td>
<td>Outcome Measure</td>
<td>Relation of Strategy to Outcome (i.e., Salient Results)</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------</td>
<td>---------------</td>
<td>-----------------------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Castro-Sánchez et al. (2012)</td>
<td>GEN</td>
<td>Classmates, organization, objectives, competition, teacher, details, independence, authority</td>
<td>Canfield Learning Styles Inventory (CLSI)</td>
<td>UG</td>
<td>NAT</td>
<td>AS</td>
<td>BS</td>
<td>EX</td>
<td>N/A For students taught using PBL, group work, study organization, relationship of ideas, and academic results were regarded as the most important strategies.</td>
<td></td>
</tr>
<tr>
<td>Cermakova et al. (2010)</td>
<td>GEN</td>
<td>ASSIST</td>
<td>UG SUR GEN BS EX N/A</td>
<td>Attentional control positively predicted deep and strategic approaches and negatively predicted surface approach, through mediation of dispositional flow.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demaray &amp; Jenkins (2011)</td>
<td>GEN</td>
<td>Academic Competence Evaluation Scales (ACES)</td>
<td>ES SUR GEN BS EX AA</td>
<td>Reported study skills was higher for students who did not exhibit ADHD symptoms; study skills mediated the relation between inattention and academic performance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Destin et al. (2012)</td>
<td>GEN</td>
<td>Cognitive–metacognitive study strategies inventory</td>
<td>HS SUR GEN BS EX AA</td>
<td>Study skills mediated the relation between perceived social status and grades.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diseth &amp; Kobbeltvedt (2010)</td>
<td>GEN</td>
<td>ASSIST</td>
<td>UG SUR SS BS EX AA</td>
<td>Use of a strategic study approach positively related to course exam grade.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Einstein et al. (2012)</td>
<td>SPEC</td>
<td>Self-testing</td>
<td>Prompted UG LAB LA BS EX SR</td>
<td>Students instructed to use self-testing did significantly better than those who did not use self-testing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inglis et al. (2011)</td>
<td>SPEC</td>
<td>Accessing online lectures, attending live lectures, seeking help at support center</td>
<td>Log records UG NAT MA BS EX AA</td>
<td>Students who attended more live lectures had better grades.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 10.1 (Continued)**
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>GEN; SPEC</th>
<th>Method</th>
<th>UG</th>
<th>SUR</th>
<th>NS</th>
<th>BS</th>
<th>EX</th>
<th>SR</th>
<th>CR</th>
<th>Study Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jairam &amp; Kiewra (2010)</td>
<td>GEN; SPEC</td>
<td>Prompted SOAR</td>
<td>UG</td>
<td>SUR</td>
<td>NAT</td>
<td>NS</td>
<td>BS</td>
<td>EX</td>
<td>SR</td>
<td>CR</td>
</tr>
<tr>
<td>Karagiannopoulou (2010)</td>
<td>GEN</td>
<td>Phenomographic interview</td>
<td>UG</td>
<td>SUR</td>
<td>GEN</td>
<td>WS</td>
<td>IN</td>
<td>N/A</td>
<td>N/A</td>
<td>Only a few students reported markedly shifting their studying approach for open vs. closed book exams; however, some indication that students make more connections (deep approach) when studying for open-book exams and engage in more fragmented memorization for closed-book exams; classroom environment also had an impact on study strategies.</td>
</tr>
<tr>
<td>Karagiannopoulou et al. (2013)</td>
<td>GEN</td>
<td>ASSIST</td>
<td>UG</td>
<td>SUR</td>
<td>SS</td>
<td>BS</td>
<td>EX</td>
<td>AA</td>
<td>N/A</td>
<td>Students with a deep approach prefer open-book exams; students who prefer open-book exams had lower scores on time management, achieving, and unrelated memorizing.</td>
</tr>
<tr>
<td>Kinder &amp; Elander (2012)</td>
<td>GEN</td>
<td>ASSIST</td>
<td>UG</td>
<td>SUR</td>
<td>LA</td>
<td>BS</td>
<td>EX</td>
<td>SR</td>
<td>N/A</td>
<td>Learning approaches and perception of the self as an author were more positively correlated for non-dyslexic as compared to dyslexic students.</td>
</tr>
<tr>
<td>Magno (2012)</td>
<td>GEN</td>
<td>LASSI</td>
<td>UG</td>
<td>SUR</td>
<td>MA</td>
<td>WS</td>
<td>EX</td>
<td>N/A</td>
<td>N/A</td>
<td>Achievement goal orientations predicted strategies; approach goals positively predicted and avoidance goals negatively predicted strategy use.</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Citation</th>
<th>Strategy Specificity</th>
<th>Strategy Description</th>
<th>Strategy Measure</th>
<th>Participants</th>
<th>Study Context</th>
<th>Domain</th>
<th>Nature of Development</th>
<th>Category Type</th>
<th>Outcome Measure</th>
<th>Relation of Strategy to Outcome (i.e., Salient Results)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malmberg et al. (2010)</td>
<td>SPEC</td>
<td>Concept maps, digital log</td>
<td>Log files</td>
<td>ES</td>
<td>COM</td>
<td>NS; SS</td>
<td>WS; BS</td>
<td>EX</td>
<td>CR</td>
<td>Infrequent strategy users showed deepest understanding, perhaps because they selected higher quality strategies or used strategies more effectively.</td>
</tr>
<tr>
<td>May et al. (2012)</td>
<td>GEN</td>
<td>ASSIST</td>
<td></td>
<td>GS</td>
<td>SUR</td>
<td>AS</td>
<td>BS</td>
<td>EX</td>
<td>SR; AA</td>
<td>Student scores in the top two quartiles of the CPX were significantly higher on the deep approach than student CPX scores in the bottom quartile, and student scores in the bottom quartile of the CPX were significantly higher on the surface approach than scores for the other three CPX quartiles. CPX patient–physician interaction scores showed a significant positive correlation with deep approach scores, and CPX overall patient satisfaction scores showed a significant positive correlation with deep and strategic approach scores. Surface approach scores correlated negatively with all CPX score categories.</td>
</tr>
<tr>
<td>McCabe et al. (2013)</td>
<td>SPEC</td>
<td>Mnemonics</td>
<td>RD</td>
<td>UG</td>
<td>SUR</td>
<td>SS</td>
<td>BS</td>
<td>EX</td>
<td>SR</td>
<td>Participants could define mnemonics, but could not describe cognitive mechanisms involved.</td>
</tr>
<tr>
<td>Moreira et al. (2013)</td>
<td>GEN</td>
<td>Learning Processes Inventory (LPI), Patterns of Adaptive Learning Scale (PALS)</td>
<td>HS</td>
<td>SUR</td>
<td>GEN</td>
<td>BS</td>
<td>EX</td>
<td>AA</td>
<td></td>
<td>Academic study skills explained 1% of the variance in grades after accounting for SES, parental involvement, teacher behaviors, and academic goals.</td>
</tr>
<tr>
<td>Authors</td>
<td>Year</td>
<td>Gender</td>
<td>Instrument</td>
<td>Level</td>
<td>Subscale(s)</td>
<td>Exam Type</td>
<td>Status</td>
<td>Study Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------</td>
<td>--------</td>
<td>------------</td>
<td>-------</td>
<td>-------------</td>
<td>-----------</td>
<td>--------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ning &amp; Downing</td>
<td>2010</td>
<td>GEN</td>
<td>LASSI</td>
<td>UG SUR</td>
<td>GEN LG</td>
<td>EX AA</td>
<td></td>
<td>Study strategies and classroom learning environment predicted GPA even when controlling for prior academic achievement; study strategies highly correlated across one year, and there was a reciprocal influence of study strategies and learning environment across the year.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ning &amp; Downing</td>
<td>2011</td>
<td>GEN</td>
<td>LASSI</td>
<td>UG SUR</td>
<td>GEN BS</td>
<td>EX AA</td>
<td></td>
<td>When controlling for prior academic achievement, all subscales of the LASSI positively predicted course grades; study strategies mediated the relation between learning environment and course grades.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orange &amp; Murakami</td>
<td>2013</td>
<td>GEN</td>
<td>LASSI</td>
<td>HS SUR</td>
<td>GEN BS</td>
<td>EX SR</td>
<td></td>
<td>LASSI scores significantly predicted self-efficacy scores; more strategic students were more efficacious.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pourshanazari et al.</td>
<td>2013</td>
<td>GEN</td>
<td>Prompted</td>
<td>GS NAT</td>
<td>AS BS</td>
<td>EX SR; AA</td>
<td></td>
<td>Teaching study skills did not increase short-term learning on final exam; however, teaching study skills in the context of PBL increased retention of material at 1-year and 4-year follow-up compared to students who just received study skills training and the control group.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rogaten et al.</td>
<td>2013</td>
<td>GEN</td>
<td>ASSIST</td>
<td>UG SUR</td>
<td>GEN WS BS</td>
<td>EX AA</td>
<td></td>
<td>Approaches to studying did not predict performance in the class.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rogers &amp; Hallam</td>
<td>2010</td>
<td>GEN</td>
<td>RD</td>
<td>HS SUR</td>
<td>GEN LG</td>
<td>EX N/A</td>
<td></td>
<td>From grade 10 to grade 11, there were differences in perceptions of exams, but no differences in study strategies. Students were categorized in four clusters: poor students, hard-working students, students with specifically poor time management, and students with specifically poor organization.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rogers</td>
<td>2013</td>
<td>GEN</td>
<td>RD</td>
<td>HS SUR</td>
<td>GEN BS</td>
<td>EX SR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Citation</th>
<th>Strategy Specificity</th>
<th>Strategy Description</th>
<th>Strategy Measure</th>
<th>Participants</th>
<th>Study Context</th>
<th>Domain Nature of Development</th>
<th>Category Type</th>
<th>Outcome Measure</th>
<th>Relation of Strategy to Outcome (i.e., Salient Results)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosen et al. (2013)</td>
<td>GEN</td>
<td></td>
<td>MSLQ</td>
<td>MS; HS; UG</td>
<td>NAT GEN BS EX</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Participants averaged 6 minutes uninterrupted studying before switching to social media; those who switched more had lower GPAs; more strategic learners switched less and had higher GPAs.</td>
</tr>
<tr>
<td>Salleh et al. (2013)</td>
<td>GEN</td>
<td></td>
<td>Study Skills Inventory (SSI)</td>
<td>HS NAT GEN WS; BS EX SR</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Career development intervention resulted in higher scores on study skills inventory.</td>
</tr>
<tr>
<td>Seabi (2011)</td>
<td>GEN</td>
<td></td>
<td>LASSI</td>
<td>UG SUR AS BS</td>
<td>EX AA</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>The LASSI was positively related to academic achievement.</td>
</tr>
<tr>
<td>Senko et al. (2013)</td>
<td>GEN</td>
<td></td>
<td>MSLQ</td>
<td>UG SUR GEN BS</td>
<td>EX SR</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Performance goals predicted surface strategies while mastery goals predicted deep strategies.</td>
</tr>
<tr>
<td>Spada &amp; Moneta (2012)</td>
<td>GEN</td>
<td></td>
<td>ASSIST</td>
<td>UG SUR GEN BS</td>
<td>EX N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Avoidance coping and test anxiety supported a surface approach to studying, and partially mediated the relation between motivation and a surface approach.</td>
</tr>
<tr>
<td>Stegers-Jager et al. (2013)</td>
<td>GEN</td>
<td></td>
<td>Prompted</td>
<td>GS NAT AS BS</td>
<td>EX AA</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Study strategies had only short-term effects for next exam with no medium- or long-term effects.</td>
</tr>
<tr>
<td>Walker et al. (2010)</td>
<td>GEN</td>
<td></td>
<td>ASSIST</td>
<td>UG SUR AS WS; BS</td>
<td>EX GG</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Deep and strategic approaches were negatively correlated with course grades; there was a positive relation between surface approach and exam grades; from beginning to end of new curriculum there was a decrease in surface approach and increase in deep and strategic approaches.</td>
</tr>
<tr>
<td>Study</td>
<td>Strategy</td>
<td>Measure</td>
<td>Participants</td>
<td>Context</td>
<td>Outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------</td>
<td>-----------</td>
<td>--------------</td>
<td>---------</td>
<td>----------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward (2011)</td>
<td>GEN</td>
<td>ASSIST</td>
<td>GS</td>
<td>SUR</td>
<td>AS</td>
<td>BS</td>
<td>EX</td>
<td>AA</td>
<td>Outcomes were positively correlated with a strategic approach but negatively associated with a surface approach; deep approaches were the most frequent.</td>
</tr>
<tr>
<td>Weinstein et al. (2010)</td>
<td>SPEC</td>
<td>Self-testing</td>
<td>Promoted</td>
<td>UG</td>
<td>LAB</td>
<td>GEN</td>
<td>WS</td>
<td>EX</td>
<td>CR</td>
</tr>
<tr>
<td>West &amp; Sadoski (2011)</td>
<td>GEN</td>
<td>LASSI</td>
<td>GS</td>
<td>SUR</td>
<td>AS</td>
<td>BS</td>
<td>EX</td>
<td>AA</td>
<td>Time management and self-testing predicted first semester academic performance above and beyond aptitude.</td>
</tr>
<tr>
<td>West &amp; Sadoski (2011)</td>
<td>SPEC</td>
<td>Time management, self-testing</td>
<td>LASSI</td>
<td>GS</td>
<td>SUR</td>
<td>NS</td>
<td>BS</td>
<td>EX</td>
<td>AA</td>
</tr>
<tr>
<td>Wissman et al. (2012)</td>
<td>SPEC</td>
<td>Flashcards (self-testing)</td>
<td>RD</td>
<td>UG</td>
<td>SUR</td>
<td>GEN</td>
<td>BS</td>
<td>EX</td>
<td>SR</td>
</tr>
<tr>
<td>Yip (2013)</td>
<td>GEN</td>
<td>LASSI</td>
<td>HS</td>
<td>SUR</td>
<td>GEN</td>
<td>BS</td>
<td>EX</td>
<td>AA</td>
<td>High achieving students had significantly higher scores on all subscales of the LASSI.</td>
</tr>
</tbody>
</table>

Notes: Strategy specificity: GEN=General; SPEC=Specific; Strategy measure: ASSIST=Approaches and Study Skills Inventory for Students; LASSI=Learning and Study Strategies Inventory; MSLQ=Motivated Strategies for Learning Questionnaire; RD=Researcher developed questionnaire; Prompted=Prompted to use strategies, strategies experimentally induced, or received strategy instruction; Participants: PK=pre K; ES=elementary; MS=middle school; HS=high school; UG=undergraduate; GS=graduate students; AD=adult; Study context: NAT=Naturalistic; LAB=Laboratory; COM=Computer based; SUR=Survey; Domain: NS=Natural sciences; SS=Social sciences; MATH=Mathematics; LA=Language arts; ART=Music or visual art; AS=Applied science; GEN=General; Nature of development: BS=Between subjects; LG=Longitudinal; WS=Within subjects; Category type: EX=Exclusive; IN=Inclusive; Analysis: COR=Correlation; REG=Regression; Outcome measure: AA=Academic achievement; CR=Constructed response; SR=Selected response.
Study Context

The next code described the context in which the study took place. The investigation was coded NAT if the study took place in the naturalistic environment in which students would study (e.g., in their classrooms). It was coded LAB if the study took place in a laboratory environment and studied strictly for a research task. The code COM was used if the study strategies were measured on a computer or in a computer-based environment. Finally, if a survey was given that did not reference any given context, it was coded SUR.

Academic Domain

Next, we coded the domain of the study outcome measure. Outcomes were classified as natural sciences (NS; e.g., biology, chemistry, physics), social science (SS; e.g., psychology, sociology), mathematics (MA), language arts (LA; e.g., reading, writing), performing and visual arts (PA; e.g., painting, music), applied science (AS; e.g., medicine, engineering), or general (GEN; i.e., no specific domain specified). In cases where there were two domains present in an outcome or multiple outcomes with different domains, both domains were indicated.

Nature of Development

The next code indicated whether intra- or inter-individual development was examined. Since there are multiple types of intra- and inter-individual designs, we specified the specific type within each category. For intra-individual development, we coded investigations as longitudinal (LG; studies in which participants are followed over multiple time periods of at least a year) or within-subject (WS; studies in which individuals are studied in multiple contexts or situations). For the inter-individual differences we labeled studies that examined differences between groups as between subjects (BS). We differentiated cross-sectional studies (CS) with a different code because they compare groups but do so across developmental levels.

Type of Categories Used

The subsequent code indicated whether the study strategy categories were generally exclusive (EX) or generally inclusive (IN). For example, if the ASSIST measure was used to code individuals exclusively into surface, deep, or strategic learners (e.g., Distry & Kobbeltvedt, 2010), it was coded EX. If, on the other hand, participants' study strategy category was allowed to be fluid or on a continuum (e.g., Karagiannopoulou, 2010), it was coded IN.

Outcome Measure

Finally, we coded the nature of the outcome measure. Codes consisted of either selected response (SR; e.g., multiple choice), constructed response (CR; i.e., essays), or overall academic achievement (AA; e.g., grade-point average or class grades).

Findings from the Empirical Literature

The full review table includes the descriptions or final codes for each of the categories (Table 10.1). We now turn to a synthesis of the current research organized by our three guiding questions.
Development of Study Strategies

To examine the development of study strategies, we describe three aspects of that development: what is developing, for whom it is developing, and how the researchers examined this development.

In terms of what strategies are developing, 34 investigations (80%) measured a general set of study strategies. For example, Kinder and Elander (2012) used the ASSIST (Tait, Entwistle & McCune, 1998) measure to examine a broad range of study strategies in order to classify learners into one of three categories (deep, strategic, or surface). Those learners that had a heavy reliance on using evidence and relating ideas were classified as deep, those that relied on time management and organizing were classified as strategic, and those that possessed fear of failure and relied on memorizing were classified as surface. Thus, these investigations do not examine how a particular strategy or strategies influence a study outcome, rather, the aim is to link more generally how the use of study strategies across the board are related to outcomes or individual characteristics (e.g., achievement goals; Rogers, 2012). Investigations that examined general strategies typically relied on self-report questionnaires with the LASSI (Weinstein et al., 1988); ASSIST (Tait et al., 1998); and MSLQ (Pintrich, Smith, Garcia, & McKeachie, 1993), the most commonly used.

Other investigations did examine specific study strategies (n = 9; 22%). For example, Malmberg et al. (2010) examined the use of concept mapping as a study tool, while Einstein, Mullet, and Harrison (2012) and Weinstein, McDermott, and Roediger (2010) examined the use of self-testing as a study strategy. Investigations of specific strategies tended to rely less heavily on self-report questionnaires as measures; instead, they tended to rely more on log files (e.g., Malmberg et al., 2010) and prompting (e.g., Bednall & Kehoe, 2011).

In terms of for whom these strategies are developing, results revealed an unsurprising reliance on undergraduate-aged students (n = 25; 63%). Indeed, there was a trend towards investigating study strategies with older participants in general—with eight investigations examining high-school students and only three examining study strategies with elementary- or middle-school students. Thus, the range of developmental levels examined in these investigations has been relatively narrow.

Lastly, we turn to how researchers tracked the development of study strategies over time. Again, not surprisingly, there was a heavy emphasis across these investigations on between-subject examinations of study strategies (n = 34; 83%). For example, Destin et al. (2012) examined how the relation between study habits and grade point averages varied according to the inter-individual differences of high-school students (i.e., social status, race/ethnicity). Investigations such as these provide evidence to support which strategies may be more helpful at a particular moment in time. However, they provide limited insight as to why particular students possessed those study characteristics to begin with. A smaller cadre of investigations (n = 9; 23%) relied on within-subjects designs that examined the use of study strategies across different contexts. For example, Karagiannopoulou (2010) examined study strategy use for open- versus closed-book tests. There were, however, two studies that examined the longitudinal change in study strategies (i.e., Ning & Downing, 2010; Rogers & Hallam, 2010). Ning and Downing (2010) examined the reciprocal relations of perceived learning experiences and study strategies in relation to academic performance over the course of a year, and Rogers and Hallam (2010) examined changes in study behaviors and perceptions of studying after one year of high school classes.
Inclusivity/Exclusivity of Study Strategies

The second guiding question concerned whether strategies were classified by the authors as inclusive or exclusive. The use of categories in the tabled investigations heavily favored the use of exclusive categories (n = 39; 98%). Given the reliance on self-report questionnaires like the ASSIST, this is not surprising since the measure and related analysis use categories such as deep, surface, and strategic to relate to given outcomes. These investigations generally relied on quantitative analyses (e.g., ANOVA, regression) that sought to partition variance in the dependent variable to see how much of that variance could be explained by the study strategy grouping.

Only one study included in this review conceptualized study strategies in an inclusive way. Karagiannopoulou (2010) used deep and surface approach categories. However, she allowed the categories to shift and discussed them on a continuum such that students could be considered to have characteristics of both deep and surface studiers simultaneously. In this investigation, she used phenomenological case-study methods to examine the fluidity of these categories across two study contexts.

Conditions of Study Strategies and Outcomes

Our third research question focused on the condition under which the study strategies were enacted and how these conditions might influence the relation between study strategy use and study outcomes. We focus on three such conditions here: study environment, academic domain under study, and the nature of the study outcome.

In terms of the study environment, 29 (73%) investigations used surveys that varied in how specifically students were prompted to consider the study context. For example, Destin et al. (2012) used a survey that did not mention any context (such as a specific class), whereas May et al. (2012) used a survey that directed students to think about a specific study context (i.e., studying for medical school classes). There were a fair number of investigations that examined study strategies in the context in which the studying was taking place. For example, Inglis et al. (2011) examined study strategies during online and face-to-face lectures with the use of log files. There were also investigations that were laboratory (n = 2) and computer (n = 1) based.

Similarly, with regard to the academic domain that the studying was taking place in, there were many investigations with no specified domain (n = 19; 48%). For investigations of study strategies contextualized within a domain, applied sciences was the most common (n = 9; 23%). This was followed by investigations in social science (n = 7; 18%), natural sciences (n = 3, 8%), mathematics (n = 2, 5%), and language arts (n = 2, 5%).

The nature of the study outcomes also differed across studies, although academic achievement was the primary study outcome (n = 19; 48%). For example, West and Sadoski (2011) used first-semester course grades to evaluate the quality of study skills used during the semester. Other investigations used selected response outcomes (n = 13) such as the results of a multiple-choice exam score (Pourshanazari et al., 2013). Yet others used constructed, or open-ended responses (n = 5), including Burnett and Bodner (2014) who measured free recall of text. Seven studies did not link study skills to a study outcome and were labeled N/A in the Table 10.1.

Finally, we turn to the relations between the study strategies and study outcomes with an eye toward other conditions (e.g., study context, academic domain) that may change the nature of those relations. As is evident from the descriptions of the relation between study strategies and study outcomes in the table, the findings are mixed. Some investigations did conclude that there were meaningful positive effects of study
context on outcome variables, such as academic achievement. In general, the result that deep and strategic approaches were better than surface approaches was well commonly identified (Buckley et al., 2010; Burnett & Bodner, 2014; May et al., 2012; Ward, 2011). However, this was not consistent across all studies (Moreira et al., 2013; Stegers-Jager et al., 2013). Others posited more particular findings about specific study strategies, which included positive effects for self-testing (West & Sadoski, 2011), generating study questions and answering study prompts (Weinstein et al., 2010), and decreased task switching to social media during studying (Rosen, Carrier, & Cheever, 2013).

However, many investigations showed little or no effects of study strategies on study outcomes. Stegers-Jager et al. (2013) only demonstrated short-term effects, whereas Pourshanazari et al. (2013) demonstrated long-term effects (at years one and four) but no short-term effects. Unlike the findings discussed in the previous paragraph, Bockers et al. (2014) and Karagiannopouou et al. (2013) did not find significant differences between learners who used a deep approach and those that used a surface approach. Moreira et al. (2013), Rogaten et al. (2013), and Rogers and Hallam (2010) demonstrated no link between general study strategies and study outcomes. Opposite from expectations, Malmberg et al.’s (2010) investigation concluded that those who used study tactics infrequently did significantly better on the study outcomes. While these mixed findings may be confusing, the explanation may lie in more complex relations between study strategies and study outcomes. For example, Ning and Downing (2010, 2011) may shed some light on these mixed results. In both studies, they demonstrated that study strategies mediated the relation between learning environments and study outcomes. Further, Malmber et al. (2010) suggested that the quantity of the strategy might not matter as much as the quality of the strategy. These issues will require further investigation to untangle these complex relations.

Discussion of Current Trends and Issues

We now consider these recent trends in light of our theoretical framing and historical trends discussed at the beginning of the chapter. With regard to our theoretical framing, we return to three issues—namely, the nature of development, inclusivity/exclusivity of categories, and the conditions needed for study strategies to lead to successful study outcomes. Current research on study strategies has generally been limited to the inter-individual differences of older students. In other words, there appears to be a heavy emphasis in the literature on elucidating the study strategies used by high-school and undergraduate students as they relate to academic achievement. The emphasis on between-subject designs rather than longitudinal designs certainly is not unique to this area of inquiry.

In addition to a focus on between-subjects and correlational designs, there appeared to be an emphasis on more general measures of studying (e.g., ASSIST, LASSI), rather than investigations of specific study strategies (e.g., self-testing; Weinstein, McDermott, & Roediger, 2010). One reason for this trend might be the ease of measuring general study strategies with a survey, rather than the more time consuming methods of either log files (e.g., Malmberg et al., 2010) or think-aloud protocols. Again, the heavy reliance on self-report is not unique to this area of research, with the areas of metacognition and self-regulation also relying heavily on self-report (Dinsmore, Alexander, & Loughlin, 2008; Hadwin et al., 2001).

We also see limited variability within the literature when we consider the way in which categories of study strategies are used. Save for one investigation, all of the
reviewed investigations categorized study strategies according to distinct, separable categories. These well delineated categories, typically referred to as approaches (i.e., deep, surface, and strategic), are used in an attempt to understand the broader patterns of studying, rather than each individual strategy used. Unlike learning styles (e.g., visual learner), which lack empirical support (Pashler et al., 2008), investigations categorizing study strategies as approaches frequently find that certain approaches (i.e., deep, strategic) are more beneficial than others (i.e., surface). There are numerous examples of analysis of variance approaches in which authors try to determine the largest amount of explained variance. As with the mixed findings in terms of significance, there is again a lot of variation with regard to the magnitude of the effects (i.e., the amount of variance explained in study outcomes by the study strategies measured). Thus, there is a tension between categorization schemes that simplify strategy use into categories and approaches that examine individual strategies.

While both these approaches certainly have merit and contribute to our understanding of study strategies, a more explicit focus on which individual strategies work in the studying literature may ultimately lead to a better understanding of how and which study strategies produce the best study outcomes. For example, in the broader literature on learning strategies, Dunlosky et al. (2013) identified 10 learning techniques that are easy to use and are claimed to be generalizable. Similarly, Fiorella and Mayer (2015) have identified eight generative learning strategies from the empirical literature. Yet, there does not appear to be a strong focus on these types of specific strategies in the studying literature we examined here. This appears to be one major difference between articles that self-identify as examining studying versus those that identify strategies as learning strategies. The analyzed studies represent a growing trend of including more variables in analysis that may help us better explain the nature of causality between study strategies and other variables, including possible moderation and mediation. Indeed, the findings by Ning and Downing (2010, 2011) are most helpful in trying to explain why there have been mixed findings in the other investigations in the pool. Similarly, Dinsmore and Alexander (2015) used moderation to help explain mixed findings with regard to deep and surface levels of processing. More investigations of these types may help elucidate the positive, neutral, and negative effects of study strategies.

These three issues taken together signify a heavy focus on what Overton (2014) called research in the Cartesian-split-mechanistic tradition (CSMT). This may be due to the influence of the Patterns of Adaptive Learning (PAL) framework. Not only was this framework highly cited in many of these investigations, it was clear from the choice of measures (operationalization) such as ASSIST and LASSI that this framework has been dominant in the investigation of study strategies. Since the PALs framework posits study approaches (rather than specific strategies) as stable traits, it is not particularly surprising to see those measures chosen in these investigations. This contrasts with examinations of specific strategies that one would expect to see either in Winne and Hadwin’s (1998) study strategy framework or Alexander’s (2004) Model of Domain Learning (MDL). For instance, in the MDL the emphasis would be on the nature of the strategies themselves (i.e., surface versus deep) rather than trait-like approaches by the learner.

PRACTICAL IMPLICATIONS

Due to the mixed findings in the literature, we want to be a bit cautious in our suggestions for practice. Indeed, one of our impressions after coding these investigations is
that they provide limited concrete evidence that we could use to suggest instructional methods to a classroom teacher or college instructor. On the whole, it does seem like students with better time management tend to do better in courses (e.g., Steger-Jager et al., 2013), but we realize that this does not offer specific suggestions for teachers or students in terms of what they can do to make studying more effective. We are also hesitant in recommending the use of general study strategy measures because the mixed findings in the reviewed studies imply that there may be issues with the construct validity of these measures.

However, there are a few specific study strategies that appear to be effective in producing better study outcomes. For example, Bednall and Kehoe (2011) found that the specific study strategies of planning, monitoring, and elaboration were helpful during a reading task. However, these benefits were only found for near-term, similar types of tasks, not for far-transfer tasks. These findings, which included monitoring and regulatory strategies, highlight the need for metacognitive and self-regulatory strategies to monitor and control cognitive strategies. Thus, we echo Pintrich’s (2002) call for training in self-regulation to complement training in study strategies. This certainly appears to be the case when examining reader profiles, where those that use the most strategies during reading (i.e., effortful processors) are generally less successful than those that use fewer strategies but use them purposefully (i.e., highly competent readers; Alexander, 2005; Dinsmore, Fox, & Parkinson, 2015).

Given the findings of Ning and Downing (2010, 2011) it is also likely that practitioners should not focus on study strategies as a singular cure-all for academic struggles. Rather, student motivation and the learning environment may have an important role to play. With regard to motivation, Cermakova, Moneta, and Spada (2010) found that dispositional flow (i.e., total absorption in what one is doing) mediated the effects of study strategies on study outcomes. In other words, if students were not motivated to study, they failed to use study strategies and did not capitalize on the study strategies they did use. With regard to learning environments, Castro-Sánchez et al. (2012) pointed out that the learning environment itself (in their case, problem-based learning) may be helpful in getting students to adopt more deep-level or strategic approaches. Thus, when devising appropriate scaffolding for struggling students, we recommend that teachers consider the multidimensional nature of learning, with study strategies being one component (Dunlosky & Rawson, 2015).

Finally, with regard to practical implications, we would point out that teachers should be aware of their students’ developmental level and intra-individual development. As the MDL would suggest, a specific strategy might only be useful at a specific point in time for an individual. For example, an individual with low domain and topic knowledge might have a particularly hard time studying using the self-testing strategy. If a student does not know enough to thoughtfully evaluate their own work, the effort to do this might be wasted. However, for higher knowledge individuals this might be a very effective study strategy.

**FUTURE DIRECTIONS**

Given the historical underpinnings and recent empirical research, our suggestions for future research are twofold. The first recommendation concerns gathering more evidence as to which specific study strategies are more or less helpful in which situations. This recommendation means that researchers will need to employ more strategy-specific measures and engage in analyses that are better able to determine specific study
strategies that would be useful in practice. For example, Pressley and Afflerbach (1995) list 32 specific reading behaviors (most of which could be considered strategic). Having a specific repertoire of study strategies such as this one, and systematically investigating one or more at a time may help researchers pinpoint which specific strategies are most helpful for a particular student at a particular time within a particular learning context. Second, each investigation should include relevant conditions that will help practitioners understand when and why specific study strategies are helpful. Scholars may turn to research in text comprehension for examples of how even minor changes in the assigned task elicit different strategies (e.g., Wiley & Voss, 1999).

The second recommendation is to broaden the approaches and methods for examining study strategies. First, a heightened focus on intra-individual development over time (e.g., Walker et al., 2010) would be helpful for practitioners working with high-school or elementary students other than undergraduates. Additionally, a focus on intra-individual development across different study contexts (e.g., Malmberg, Jarvenoja, & Jarvela, 2010) would be helpful to better understand which strategies work when. Investigations should also include multiple perspectives on categories of study strategies or approaches to study strategies. This will necessarily involve methods (both theoretical and analytic) that go beyond analysis of variance. By making our investigation of study strategies more strategic, hopefully educational psychologists can improve our theoretical understanding of the role of study strategies and, ultimately, be able to provide more specific recommendations for practitioners. In this way, the investigation of study strategies can continue to fulfill what we believe is a major goal of our field: to inform educational practice so that all students can learn more effectively.

REFERENCES

* denotes the reference was part of the systematic review


