

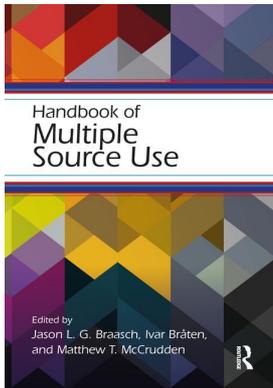
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### Cold And Warm Perspectives On The Cognitive Affective Engagement Model Of Multiple Source Use

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# 3

## COLD AND WARM PERSPECTIVES ON THE COGNITIVE AFFECTIVE ENGAGEMENT MODEL OF MULTIPLE SOURCE USE

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The traditional conception of reading has been one of a student immersed in a favorite book. Yet, reading in the 21st century has taken on quite a different form. Rather than reading a single text, students are often called upon to select and process multiple texts, from among the plethora of sources instantaneously available on the Internet. Beyond print books, students today are required to make sense of sources as varied as hypertexts, multimedia texts, images, videos, and text-based websites, all varying in quality and accuracy. Moreover, text processing has become increasingly conceptualized as an instrumental activity for students, guided by the tasks assigned *to* them rather than by the activities chosen *by* them.

Despite the frequency with which students engage in multiple source use (MSU), research in this area has been limited in comparison to the extensive research on single-text comprehension. In addition, MSU research has primarily focused on behavioral aspects of source use and the cognitive processes involved in students' construction of mental representations of multiple texts (Brand-Gruwel, Wopereis, & Walraven, 2009; Britt, Perfetti, Sandak, & Rouet, 1999; Perfetti, Rouet, & Britt, 1999). In contrast, affective or motivational aspects of MSU have been fairly neglected in the literature. This chapter introduces a theoretical model conceptualizing students' MSU during complex task performance as the result of both cognitive and behavioral *and* motivation factors. We refer to this model as the *Cognitive Affective Engagement Model of Multiple Source Use* (CAEM). Our goals for this chapter are five-fold. First, we consider salient features of prominent models of MSU. Second, we discuss motivational and affective constructs

with direct relevance to MSU. Third, we introduce the CAEM and provide a theoretically driven rationale for its development. Fourth, we use the CAEM as an explanatory paradigm for understanding empirical findings in the literature on single-text comprehension and MSU. Fifth, we discuss implications of the CAEM for learning in the 21st century.

Throughout this chapter, the term *text* is used to refer to information or content presented as written discourse (Ricoeur, 1991). A complementary term *source* is used throughout this manuscript to emphasize the authored nature of text, as generally written by a person or persons for a purpose (Alexander & Fox, 2004). As such, when referring to sources we refer to written discourse (i.e., text) while emphasizing its constructed nature or its document information (i.e., metadata about text origin, like author or publisher). While the CAEM is primarily focused on learners' understanding and use of multiple texts, it may be extended to understand how learners also engage with non-textual or mixed-media sources of information, like images or videos. In consideration of these definitions, the CAEM is described as a model of MSU, rather than text use. In this way, the model has implications beyond students' comprehension and integration of strictly linguistic content, encompassing the consideration and evaluation of all manner of source information.

## COLD PERSPECTIVES ON MULTIPLE SOURCE USE

Over the last 25 years, research on multiple-text comprehension and integration has proliferated. In that time, at least three models of MSU have been proposed.

### *Documents Model*

The earliest model to address MSU was the *Documents Model of Multiple Texts* (DM; Britt et al., 1999; Perfetti et al., 1999). This model posits that the comprehension of multiple sources occurs through readers' construction of two layers of cognitive representations of texts, the integrated mental model and the inter-text model. The *integrated mental model* is focused on content and represents students' unified understanding of the common topic or issue discussed across texts. The *inter-text model* is a structural model that maps the various relations among multiple texts. In particular, the inter-text model maps the relations between information within a text and that text's document markers (i.e., metadata, like title and author) as well as the conceptual relations among multiple texts (e.g., corroborating, complementing, or refuting one another). Comprehension occurs when students connect their integrated mental model with their inter-text model of multiple texts.

These two models may be connected in four different ways (i.e., separate representation model, mush model, tag-all model, documents model), all varying in the extent to which information is integrated, important points arising across texts are emphasized, and specific pieces of information are associated with their sources of origin. For novice learners, the DM is the most adaptive representation of multiple texts. In forming the DM, students integrate information across multiple texts, while excluding unimportant or irrelevant information, and track where individual pieces of information come from, to form judgments of information quality and reconcile any discrepancies that arise.

### *Multiple-Documents Task-Based Relevance and Content Extraction Model*

As a complement to the DM (Britt et al., 1999), the *Multiple-Documents Task-Based Relevance and Content Extraction Model* (MD-TRACE; Rouet, 2006; Rouet & Britt, 2012) was introduced to position the DM within a broader, process-oriented framework. Specifically, the MD-TRACE conceptualizes multiple document use as unfolding through a five-step process. In Step 1, individuals develop a *task model* or a cognitive representation of task demands and how these may be satisfied. In Step 2, individuals determine that their knowledge is insufficient to meet task demands and, thus, that MSU is necessary (i.e., *information need*). Step 3 includes the core behaviors associated with MSU. Specifically, in this step, students determine information relevance, process text content, and evaluate sources. These behaviors lead to students' formation and updating of a documents model to represent their comprehension of multiple texts. Step 4 is dedicated to students' development of a written product that they believe conforms to task demands. Finally, in Step 5, individuals verify that their written products match task demands and, if necessary, cycle back to earlier phases of the model.

### *Information Problem Solving on the Internet*

Like the MD-TRACE, another model introducing a process-oriented approach to understanding MSU is the *Information Problem Solving on the Internet Model* (IPS-I, Brand-Gruwel et al., 2009). The IPS-I model outlines five constituent skills that students need for online MSU. These are: (a) *defining the information problem* to be solved or setting goals for information use; (b) *searching* for and selecting information sources; (c) *scanning* the available information to determine relevance; and (d) *processing* some of the information more deeply, before (e) *organizing and presenting* information to generate a response. Throughout the IPS-I model, information use is supported by students' reading skills, computer skills, skills with regard to source evaluation, and regulatory processes. Beyond the aforementioned theories, a number of other cognitivist models inform current understandings of students' interactions with multiple texts (e.g., Goldman, Braasch, Wiley, Graesser, & Brodowinska, 2012; Lucassen & Schraagen, 2011).

### **COLD FACTORS IN MSU**

A number of conclusions about the nature of students' MSU can be extracted from the models discussed. First, the MD-TRACE and the IPS-I recognize the importance of task goals in driving MSU. This conclusion is supported by findings that differences in task goals assigned to students result in differences in MSU and task performance (McCrudden, Magliano, & Schraw, 2010; Wiley & Voss, 1999). Second, the MD-TRACE, IPS-I, and the DM are reliant on students' knowledge and performance of skills necessary for MSU, including those associated with determining information relevance, processing and comprehending texts, and evaluating sources. Despite these skills' theorized importance, findings have been mixed regarding students' abilities to perform them. Specifically, while learners have proven adept at making relevance determinations and scanning information quickly, they have been found to experience more

challenge with processing content deeply and evaluating sources (Bråten & Strømsø, 2011; Britt & Aglinskias, 2002; Goldman et al., 2012; Wolfe & Goldman, 2005).

Third, all three models focus on a task product, conceptualized as either a specific answer to a query (IPS-I; Brand-Gruwel et al., 2009) or a more elaborated written response (MD-TRACE; Rouet, 2006), as the ultimate outcome of multiple-text use. Most importantly, while all three of these models offer cognitive and procedural accounts of MSU, they do little to consider the more affective dimensions of text processing. So, collectively, we refer to these models as *cold* approaches to MSU.

## WARM PERSPECTIVES ON MULTIPLE SOURCE USE

Missing from the prior models is any meaningful conceptualization of how individuals affectively engage in the processing of multiple texts. It is understood that students respond when engaged in reading (Gambrell, 2011; Wigfield & Guthrie, 2000). These responses can be positive or negative, emotionally engaged or disengaged, sparked by internal factors, like students' interests, motivations, or attitudes toward the topic or a task, or externally driven by features of text or task (Hidi, 2001; Schiefele, 2009; Silvia, 2005). Further, we may expect such affective reactions to arise regardless of whether one or more texts are involved in students' processing.

### *Motivation for Reading*

Although under-examined in the literature on MSU, motivation has long been associated with single-text comprehension (Guthrie & Wigfield, 1999; Wigfield & Guthrie, 2000). Guthrie, McGough, Bennett, and Rice (1996) define motivation for reading as “internalized reasons for reading that activate cognitive operations, which enable individuals to perform such acts as acquiring knowledge, enjoying aesthetic experiences, [and] performing tasks” (p. 167). In effect, Guthrie et al. (1996) refer to reading engagement as *motivated cognition*.

When students are motivated to read, they are driven to satisfy reading goals, engage in deep-level strategic processing, activate prior knowledge to thoroughly comprehend content, and modify their initial understanding through reading. Indeed, motivation for reading has been associated with attention allocation (Anderson, 1982; Hidi, 2001), increased persistence when reading (Ainley, Hidi, & Berndorff, 2002; Guthrie et al., 2009), increased and deeper strategy use (Aarnoutse & Schellings, 2003; Pressley & Afflerbach, 1995; Schiefele, 1999), and greater self-regulation and metacognition (Paris & Winograd, 1990; Pintrich, 1999)—all factors that play a role in MSU.

### *Interest*

Studies of reading engagement have investigated such diverse motivational constructs as interest, intrinsic motivation, achievement goals, task values, and self-efficacy as associated with reading comprehension (Wigfield & Cambria, 2010; Wigfield & Guthrie, 2000). No doubt, all of these factors guide students' processing and comprehension of both single and multiple texts. Of these motivational constructs, interest may be

especially pertinent to understanding MSU. Interest has been defined as the psychological state of arousal or engagement with a particular environmental stimulus (Hidi & Renninger, 2006). This arousal may take on two forms, as either an enduring predisposition toward engagement with some idea, object, or person (i.e., individual interest) or as a fleeting, externally triggered reaction to some stimulus (i.e., situational interest; Alexander, 2003; Hidi & Renninger, 2006). When it comes to MSU, we may expect students to have an abiding or established interest in some topic or domain about which they are reading or to be momentarily intrigued by some issue or task in which they are engaged.

Krapp (1999) suggests that interest may be distinguished from other motivational constructs in at least two ways. First, interest, unlike other motivational factors, is not only an internal state, within the student, but rather arises through a *person-object* interaction. As such, interest represents a learners' attraction to a particular topic area or activity. Second, interest is considered to be both an affective and cognitive construct (Hidi & Renninger, 2006; Kintsch, 1980; Krapp, 1999). It extends beyond positive feelings of liking or enjoyment to capture students' cognitive appraisals of the relevance or value of a particular topic or task to them or to others. As such, interest may be an especially pertinent motivational construct to examine in understanding MSU, as it captures students' desires to learn about a specific topic or issue using multiple texts. Understandably, therefore, interest is the motivational variable most commonly investigated in the emerging literature on motivation and MSU (Bråten et al., 2014; Bråten & Strømsø, 2006; Grossnickle, 2014; Strømsø & Bråten, 2009). Indeed, initial work in this area has demonstrated that both individual and situational interest are associated with students' strategy use during multiple-text task completion, as assessed through both log data and self-report (Bråten et al., 2014).

### *Attitudes*

Just as interest has been described as including both affective and cognitive components, so have students' attitudes. Ajzen and Fishbein (1977) define attitudes as individuals' positive or negative evaluations of objects in their environment, which can be conceptualized as falling on a "bipolar evaluative or affective dimension" (p. 889). Attitudes or prior beliefs have been associated with students' information processing in both single and multiple-text contexts (Kardash & Scholes, 1996; van Strien, Brand-Gruwel, & Boshuizen, 2014). Specifically, students have been found to apply different evaluative standards when judging attitude-consistent versus attitude-inconsistent information. That is to say, learners tend to more favorably evaluate information that coincides with their existing points of view, while scrutinizing evidence that seems to conflict with their perspectives (Lord, Ross, & Lepper, 1979; Maier & Richter, 2013; McCrudden & Barnes, 2016). More generally, attitudes have been found to be associated with students' attention allocation, strategy use, and depth of processing when encountering texts (Eagly & Chaiken, 1998; Kardash & Howell, 2000).

As with interest, the mechanisms whereby attitudes impact text processing have been considered to be affective and cognitive in nature. "Motivation may affect reasoning through reliance on a biased set of cognitive processes: [including] strategies for accessing, constructing, and evaluating beliefs" (Kunda, 1990, p. 480). In other

words, students' attitudes, alongside other motivational factors, are associated with their cognitive processing of text.

Collectively, we refer to motivational and affective constructs like interest and attitudes as *warm* factors shaping students' MSU. While extensively explored in single-text processing (Guthrie & Wigfield, 1999; Kardash & Howell, 2000; Wigfield & Guthrie, 2000), these factors have been applied to MSU only to a limited extent. In developing the CAEM, we sought to provide a framework for conceptualizing the role of both cold and warm factors in students' MSU and cross-textual integration and their relations.

## DEVELOPMENT OF THE COGNITIVE AFFECTIVE ENGAGEMENT MODEL

Initial conceptions of the CAEM emerged through a thorough review of the literature on single and multiple-text processing (List, 2014). The CAEM was further developed based on our own work examining students' MSU across a variety of tasks (e.g., List & Alexander, 2015; List, Alexander, & Stephens, 2017; List, Grossnickle, & Alexander, 2016a, 2016b). In particular, we have asked undergraduate students to research complex and controversial topics as varied as children's linguistic development, planetary habitability, the Arab Spring in Egypt, and overpopulation. The results of these studies were the catalyst for our reconceptualization of MSU.

### *Limited Responses*

Across the studies we conducted, several intriguing patterns in participants' written responses emerged. First, we often found a sizable population of students that constructed quite *limited* responses. These were responses that often-times nominally satisfied the minimum requirements posed by a particular question or task but that, nevertheless, demonstrated limited effort and source use on the part of participants. For instance, when asked: *Which planetary features may promote or hinder habitability? Please explain*, one student's response was: "The factors that promote planetary habitability are the presence of oxygen, nitrogen, carbon and hydrogen, mass and water" (List & Alexander, 2015). The composition of such a terse response is, of course, entirely understandable for students asked to complete a cognitively demanding task of little relevance or interest to them as part of a research study.

We gained further insight into these types of responses by asking students to rate their confidence in their answers, as well as to justify those ratings (List & Alexander, 2015). Of note in these justifications was the frequency with which participants discussed their interest and motivation, or lack thereof, as predominant factors driving their MSU and response composition. Representative of such participants, one student explained: "It was hard for me to motivate myself to read the passages to find an answer because of my disinterest in the topic," and another who said, "The topic is extremely boring to me. It was really hard to sit and read the articles when I . . . did not care at all about the topic." For these students, disinterest or amotivation seemed to drive their engagement with texts, despite these factors being largely absent from leading models of MSU.

### Quality Responses

In contrast to students whose responses were characteristically terse, we observed others who composed particularly thorough and thoughtful responses to assigned tasks. Again, these were students asked to complete complex and cognitively demanding tasks in a laboratory setting. Nevertheless, in responding to the same question on planetary habitability (List & Alexander, 2015), some students produced answers like:

Factors promoting or hindering planetary habitability are often related to the fulfillment of basic physiological needs. For example, planets that are able to host various life forms typically require a majority supply of water, readily available to be used as sustenance for existing life forms on the planet (*The New York Times*). Additionally, a varying range of temperatures, typically affected by orientation to the sun, offers the planet's organisms a variety of living conditions and allows them to choose one that is most suited to their systems (*The New York Times*). One such recently discovered planet, Gliese 581g, could support diverse life forms because of its varying temperatures and abundant water supply, among other factors (*The New York Times*).

This response is notable not only for its length, but also for its organization, inclusion of well-elaborated examples and explanations, and references to specific sources read.

Students' justifications for ratings of response confidence offer additional insights into MSU (List & Alexander, 2015). Students producing written responses of a higher quality also tended to base their response ratings on evaluations of the trustworthiness and quality of the sources they used in composing their answers and the accuracy of the information they contained—evaluation criteria rarely mentioned by other participants. One student justified her response confidence as based on corroboration and evaluation of the trustworthiness of the sources she used in composing her response:

I used two different sources and read the same answers. Even though Wikipedia isn't that reliable, I read a journal article that presented the same information. The journal article is a very reliable source, so I feel pretty confident in my answer.

Another student considered author credentials and the scientific processes involved in gathering the information he used in composing his answer: "I am confident in this response because it is from a journal. This journal is probably peer-reviewed, and the information contained in the article was probably found using research methods, so it has at least some validity to it."

This focus on evaluating source and information quality was uniquely exhibited by some students and not others. In developing the CAEM, we were motivated to answer the fundamental question of which factors resulted in some students developing only brief, perfunctory responses to multiple-text tasks, while other students composed elaborated responses, based on considerations of source trustworthiness and reflecting multiple-text integration and corroboration.

### *Engaged Responses*

The most comprehensive set of data we have on undergraduates' MSU to date comes from a study asking students to write an argument about who should hold power in Egypt, following the Arab Spring (List, 2014; List et al., 2017). As in our prior work, the resulting responses included two extremes in students' written products, with regard to detail and quality. However, within these data, a third type of response emerged. This response group reflected extensive engagement with the information presented across multiple texts, while at the same time demonstrating limited critical analysis or source evaluation. One illustrative response was as follows:

The United States should support General el Sisi and the military regime currently in power in Egypt for many reasons. General el Sisi is looking out for the Egyptian public, not a specific or particular group. In the public survey, they discuss how . . . 79% of all Egyptians want national reconciliation and with the help of Sisi, Egypt believes their country could be restored. In the blog post Sisi promised to protect peaceful protest [and is] opposed to the protest taking place by Muslim Brotherhood protestors. Sisi also promised to only use violence against those who are violent protestors . . . With the power being under Sisi there is greater control of violent attacks and protestors.

This response included information from multiple sources. However, it was decidedly one-sided in its endorsement of General el Sisi, despite the sources cited actually presenting conflicting information about the benefits and limitations of El Sisi's rule and who should hold power in Egypt. Further, this response evidenced limited integration, separately presenting information gathered from each source, in a sequential fashion, while drawing limited connections between texts. Moreover, in listing reasons for supporting General el Sisi, this respondent drew on a variety of sources without evident regard for source quality or bias. Put in DM terms, this response illustrates a mush model approach to multiple-text integration (Britt et al., 1999). In this response information from across multiple texts was nominally connected due to its support for General el Sisi, but no consideration of conflicting information presented by these same documents was evidenced.

To appreciate the non-evaluative nature of the prior response, it helps to contrast it with other, more critical responses in which the students questioned the claims and evidence included in sources, through corroboration or by introducing counterpoints, or noted the varying quality of the sources themselves. As one more critical student wrote:

Given the articles I have at my reach here, I know that El Sisi has suspended the Egyptian constitution and thus limited the rights of the public . . . However, Morsi's constitution was lop-sided as it allowed him total rule in terms of decision making and it could not be appealed in a democratic manner whatsoever.

Another student discussed the relative trustworthiness and merits of Twitter as an information source:

Another source is Twitter. Twitter is rather unreliable, but often does post true and current events as they happen. The problem is that it is very hard to verify unless there are pictures with a date stamp, or video that has some sort of timetable proof.

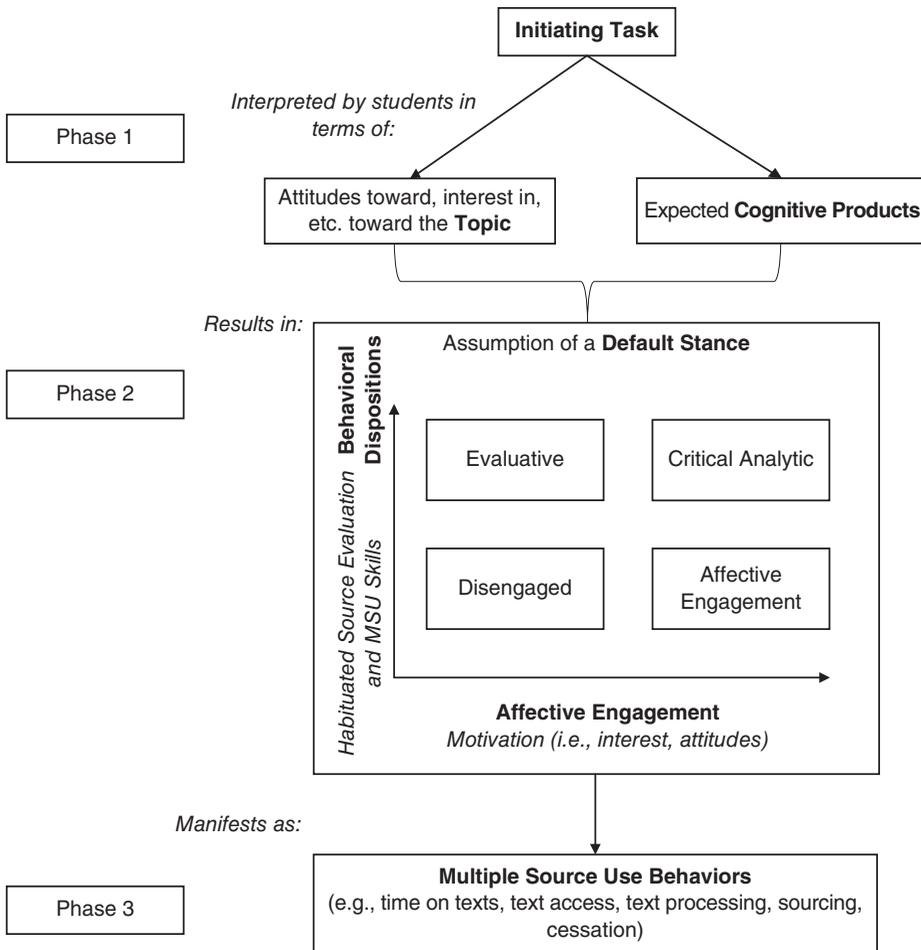
As these examples illustrate, key distinguishers of the quality of students' responses were their consideration and evaluation of sources and the information they contained. These included students' judgments of different document types, considerations of author credibility and bias, comparisons of information across sources, and analyses of information quality. Indeed, evaluative processes have repeatedly been identified as core to MSU (Braasch, Rouet, Vibert, & Britt, 2012; Britt et al., 1999; Stadtler & Bromme, 2014) and as markers of successful student engagement with multiple texts (Goldman et al., 2012; Wiley et al., 2009). As conceptualized in the DM, such responses may be considered to be reflective of documents model construction (Britt et al., 1999). These responses may be distinguished from the mush model previously exemplified through their explicit and evaluative consideration of document information and their reconciliation of conflicting information presented across texts.

Based on our analysis of the various typologies of students' responses, we developed the CAEM. The CAEM pertains to reading situations that can be characterized in four ways. At the most basic level, the CAEM conceptualizes students' engagement with multiple textual sources. Models exist that, like the CAEM, specify the role of cognitive and motivational factors in single-text processing (e.g., Guthrie & Wigfield, 1999; Pintrich, Marx, & Boyle, 1993). However, the CAEM is specifically focused on reading situations requiring the understanding, integration, and reconciliation of information across multiple sources of information. Further, the CAEM considers students' engagement with multiple texts in response to a task either externally assigned or internally generated by the learner (McCrudden & Schraw, 2007). While some models consider the tasks assigned to learners to be directly assumed (McCrudden & Schraw, 2007), the CAEM conceptualizes even externally assigned tasks to be reinterpreted by learners prior to task completion. Moreover, the CAEM addresses MSU in response to complex tasks, requiring elaborated responses based on information in texts. Such complex tasks require that students produce external products (e.g., written responses) for task resolution, corresponding to learning. Finally, in contrast to existing models in the field (e.g., Braasch et al., 2012; Stadtler & Bromme, 2014), the CAEM addresses MSU when multiple sources relate to one another in a myriad of ways, including agreeing with, complementing, contradicting, or elaborating upon another.

In formulating this model, we were specifically interested in how students' motivations and evaluations of information sources alter the course of their engagement with multiple texts.

### MULTIPLE SOURCE PROCESSING ACCORDING TO THE CAEM

The CAEM conceptualizes students' MSU as including three distinct phases. MSU commences with (a) an *initiating task*; in response to this task, students adopt (b) a *default stance* toward multiple-text engagement; this default stance corresponds to students' execution of a host of (c) MSU *processes and behaviors*. The three phases of the CAEM are depicted in Figure 3.1.



**Figure 3.1** Cognitive Affective Engagement Model of Multiple Source Use.

## INITIATING TASK

In keeping with prior models (Brand-Gruwel et al., 2009; Rouet, 2006; Rouet & Britt, 2012), the CAEM posits the process of MSU as beginning with an *initiating task*. Whether externally assigned or self-generated, this initiating task serves to set the goals and establish the parameters for multiple-text engagement. According to the CAEM, any initiating task may be defined by two key characteristics: its *topic* or focus and the *cognitive product* that students may expect to result from MSU.

According to the MD-TRACE, the task model that students develop to initiate MSU is a cognitive representation of task demands that unites the instructions that students receive with a host of pragmatic factors, like the variety of documents available to students and the time required for task completion (Rouet & Britt, 2012). In the CAEM, we conceptualize the cognitive product aspect of an initiating task more narrowly, as the specific learning or knowledge outcomes that students expect as a consequence of multiple-text engagement. In this way, the CAEM emphasizes the importance of students' personal re-interpretations of task demands in guiding MSU. The cognitive

products that students expect to emerge may be distinguished according to whether those expectations reflect a desire for an expedient, albeit shallow, response or for deeper examination and understanding (Alexander & DRLRL, 2012). As such, these expectations serve as initial indicators of students' motivation for task completion and their ensuing level of engagement with multiple texts.

Prior work has typically shown little regard for topic when investigating the role of different task features in guiding MSU. The CAEM is unique in identifying the topic of the task as a key factor in determining how students perceive and approach MSU. Drawing on investigations of constructs like interest and prior attitudes (Ainley et al., 2002; Hidi, 2001; Kardash & Howell, 2000), we argue that in the CAEM that the specific topic students investigate using multiple sources plays a defining motivational and cognitive role. For instance, while some topics may be interesting or important to students, others may not be. Further, while some topics may address controversial issues, like climate change or evolution, other topics may be of a more quotidian nature.

### DEFAULT STANCE

Once students represent an initiating task in terms of its topic and the cognitive products expected to result, they then adopt a *default stance* toward the task. A default stance constitutes a cognitive and motivational orientation toward a particular multiple source task. The phrase *default stance* is used purposefully to emphasize students' initial starting points in approaching multiple-text tasks, with the recognition that such stances may evolve during the course of task completion. At the same time, students' default stances or initial orientations toward MSU may be expected to have a somewhat general pattern across many multiple-text situations. Moreover, in electing to use the term default stance we emphasize that students' orientation toward a particular task may arise somewhat automatically or heuristically, without particular metacognitive engagement on the part of the learner.

The default stance is defined by two axes: students' *affective engagement* with and their *behavioral dispositions* toward MSU and evaluation. The affective engagement dimension captures students' motivational orientation toward the initiating task, including their initial levels of individual and situational interest and existing attitudes. The behavioral dispositions dimension reflects students' habituated practices with regard to source use and evaluation, that may be employed across various task conditions. These axes and resulting default stance profiles are depicted in Figure 3.1.

Depending on their positioning along both of these axes, students may be expected to adopt one of four default stances toward any initiating task. At one extreme, there are those students who possess well-developed habits with regards to source evaluation and a high level of affective engagement with a particular initiating task. These students are both highly engaged by and sophisticated in their MSU, accessing rich sources and critically analyzing and evaluating these sources and their contents to achieve deep understanding of the topic. We refer to those occupying this quadrant as manifesting a *critical-analytic* default stance. At the other extreme, there are students who exhibit neither a high degree of affective engagement with a particular task nor robust habits with regard to source evaluation. We label those manifesting this default stance as *disengaged*. We would expect disengaged students to be limited both in terms of the volume of information they access during MSU and the depth with which they process the resulting content.

Two additional default stances fall at the extremes of each axis. Students who are highly engaged by the topic of a particular initiating task, without evidencing any evaluative behaviors, may be said to adopt an *affectively engaged* default stance. These students may be distinguished by the volume of information they process during MSU, while not engaging in particularly critical or deep-level processing. Conversely, students habituated to engaging in behaviors associated with the evaluation of multiple texts, even absent particularly high levels of motivation for an initiating task, may adopt an *evaluative* default stance toward MSU. These students may be characterized by their engagement in behaviors associated with source evaluation. However, these evaluations may only be heuristic or perfunctory in nature.

When enacted, each default stance profile adopted may result in students carrying out a distinct pattern of source use processes and behaviors. Such processes and behaviors, captured in the empirical literature on MSU, will be discussed in light of insights from the CAEM.

## MSU PROCESSES AND BEHAVIORS

Existing models have identified a host of behaviors associated with MSU (Brand-Gruwel et al., 2009; Rouet & Britt, 2012). These include students' text access, processing and strategy use, source evaluation, and, ultimately, cessation of engagement with multiple texts. The CAEM considers these same behaviors but is more specific in hypothesizing that, while all learners may engage in the same behaviors during MSU, the nature of these behaviors differs according to the stances students adopt.

### *Text Access*

Text access is defined by the number and type of texts students visit during task completion. We may expect students adopting a disengaged stance toward MSU to be especially limited in their text access, visiting few sources. Conversely, students characterized by an affectively engaged stance may be expected to access a substantial number of texts, irrespective of trustworthiness. Relative to the two extremes of disengaged or affectively engaged learners, those adhering to an evaluative or critical-analytic stance may be expected to access a moderate number of sources. Moreover, what would distinguish these two profiles from their counterparts would be their preference for accessing sources they regard as high in trustworthiness or reliability.

The empirical literature offers initial support for these hypothesized patterns of text access. For example, in a study involving a single text, Ainley et al. (2002) found students demonstrating high levels of individual and topic interest to be more persistent in text access. Persistence was operationalized as engagement or the number of text sections students were willing to process and the amount of time they devoted to text access. Further, Goldman et al. (2012) found a key differentiator of students learning a great deal or disproportionately little from a multiple-text task to be their engagement in source evaluation. Specifically, students could be distinguished according to the ratio of time they devoted to accessing reliable versus unreliable texts and the number of visits and revisits they had to these two source types. Likewise, Anmarkrud, Bråten, and Strømsø (2014) found students' think-aloud utterances evidencing evaluative

strategy use to be associated not only with their discounting of untrustworthy sources during a ranking task, but also with performance on an argumentative writing task.

### *Processing*

A fundamental distinction drawn in the literature on reading comprehension is between surface- and deep-level processing (Dinsmore & Alexander, 2012; Salmerón, Naumann, García, & Fajardo, 2017; Wolfe & Goldman, 2005). While surface-level processing is superficial in nature, deep-level processing has been associated with the deployment of strategies for developing understanding, building connections, evaluating content, monitoring performance, and considering new information in light of prior knowledge. Such strategies have been shown to result in improved comprehension. Within the context of MSU, Bråten and Strømsø (2011) carry this distinction forward by separating out low-level MSU strategies focused on *information accumulation* from deep-level strategies addressing *cross-textual elaboration*.

Default stances identified in the CAEM may be distinguished according to their relative engagement in surface- versus deep-level strategies during MSU. Students in the disengaged stance may be expected to primarily rely on low-level strategies, like scanning to quickly identify a response located explicitly in text (Salmerón et al., 2016). For the disengaged profile, we would expect deep-level strategy use to be minimal, as these students would be unmotivated to engage in the cognitively demanding processing necessary for high-level strategy use. Students classified as affectively engaged may adopt strategies associated with information accumulation. These students may be eager to learn as much as possible about their topic of interest, but may not have the strategic or evaluative skills in place to engage in the deep-level processing necessary for multiple-text corroboration and integration. Students adopting an evaluative default stance may possess the strategic abilities to both accumulate information and evaluate source quality and content, but may elect to use the latter set of skills only to a limited extent. Those fitting the critical-analytic default stance would be expected to manifest deep-level strategies in their MSU. This approach to text access would include students both well practiced at the skills associated with mapping and evaluating relations among texts and sufficiently motivated to implement these strategies. In conceptualizing the role of deep-level processing in MSU, the CAEM emphasizes that students' motivation to engage is a necessary condition for such processing to occur.

### *Evaluation*

Source evaluation has been associated with deep-level processing (Afflerbach & Cho, 2009; Bråten & Strømsø, 2011) and has been identified as essential for supporting multiple-text comprehension and integration (Britt et al., 1999; Perfetti et al., 1999; Stadler & Bromme, 2014). Yet, students have been found to engage in the processes associated with text evaluation, like considering source information or citing sources, only rarely (Britt & Aglinskas, 2002; List et al., 2017). Moreover, even when evaluating texts, students have been found to rely on heuristics or superficial cues (e.g., document type) to judge text trustworthiness (Brem, Russell, & Weems, 2001; List et al., 2017), rather than engaging in deeper analysis.

The evaluation of texts may be considered to be a key feature distinguishing different CAEM default stances. Disengaged and affectively engaged students likely evaluate sources only infrequently, if at all. In contrast, students manifesting an evaluative or critical-analytic default stance are characterized by their tendency to evaluate sources to varying degrees. Specifically, we might expect those taking on an evaluative stance to routinely judge texts, perhaps by using some general “rule of thumb” for source evaluation (e.g., “Rely on journal articles and avoid blogs.”). By comparison, those adopting a critical-analytic stance would do so more deliberately or in a manner more sensitive to the contextual features of the topic or the task. For instance, students adhering to a critical-analytic stance might find that forms of social media, while typically not reliable sources of information, are potentially credible sources in the case of very contemporary and unfolding events (e.g., a mounting protest). We would also hypothesize that these critical-analytic students would demonstrate cross-textual corroboration and evaluation in the service of forming an integrated representation of multiple texts.

### *Cessation*

Limited work has considered why students may stop accessing information from multiple texts. The CAEM considers the end of MSU (i.e., cessation) to be a particularly important step for two primary reasons. First, this is a critical regulatory moment during which students reflect on their information access and determine that their desired cognitive products have been sufficiently formed. Second, cessation represents a key juncture between students’ engagement in information access and response composition; a transition identified as important in other theoretical models of MSU (Brand-Gruwel et al., 2009; Rouet & Britt, 2012).

The four CAEM profiles are all expected to differ according to the markers used to determine when the need for information is satisfied (i.e., cessation). Students exhibiting a disengaged profile may simply cease source use once a minimally satisfying response to an initiating task has been crafted. Students in the affectively engaged profile may cease text access for external, rather than internal, reasons, such as when the time allocated for the location of sources has been reached. Motivated to accumulate information, affectively engaged students might also cease source access when they achieve content saturation; that is, when little new information is able to be located. Cessation for students adopting an evaluative stance may be triggered by habits of practice or generic thresholds, such as consulting three sources from a Google search results page. Finally, critical-analytic students might decide to cease text access by considering specific criteria associated with topic or task or by judging their cognitive products to be successfully developed. For instance, when presented with a controversial topic, critical-analytic students may cease source use only after seeking out several credible sources on both sides of an issue to make an evidence-based decision about which position to support. In a rare study examining a cessation-related construct, students’ justifications for leaving webpages, Goldman et al. (2012) found the reasoning of better and poorer learners to differ. Specifically, while poorer learners left webpages because they lacked keywords matching exactly to their search query, better learners were significantly more likely to leave webpages with the desire to seek out additional information. Such differences in reasoning point to distinctions suggested by the CAEM.

## CAEM-LIKE PROFILES IN PRIOR RESEARCH

Prior research has provided initial evidence for the emergence of CAEM-like profiles in students' multiple-text use. For example, Lawless and Kulikowich (1996) used cluster analysis to identify three profiles of undergraduates' hypertext navigation. Specifically, Lawless and Kulikowich characterized students as belonging to apathetic, knowledge-seeking, and feature-exploring user profiles. Apathetic navigators were characterized as devoting limited time to information access, overall, and as being restricted in their access of both informational content and multimedia features. Knowledge-based navigators constituted a user profile characterized by their particularly strong attendance to information-based hypertexts. As a contrast, feature explorers were navigators devoting particular attention to the multimedia features in hypertext, over informational content, while also spending a substantial amount of time on hypertext access. Although imperfect analogs, these user profiles can be said to correspond to disengaged, critical-analytic, and affectively engaged CAEM profiles, respectively. Moreover, as hypothesized by the CAEM, students belonging to the apathetic/disengaged user profile performed the lowest, with feature explorers/affectively engaged students performing at or below the average, and knowledge seekers/critical-analytic users demonstrating the highest level of performance.

Like Lawless and Kulikowich (1996), Killi, Laurinen, and Marttunen (2008) used cluster analysis of think-aloud and log data to classify secondary students into five profiles of source evaluation. The profiles identified included: versatile evaluators, relevance-oriented evaluators, limited evaluators, disoriented readers, and uncritical readers. These profiles were distinguished according to a number of dimensions. Limited evaluators, disoriented readers, and uncritical readers were limited in their source evaluation. As a contrast, students in the versatile evaluators profile produced a large number of evaluation-related utterances, overall, along with reporting a high number of utterances specifically related to source credibility. By comparison, relevance-oriented evaluators were particularly noteworthy for the number of relevance-related comments they produced, leading to a moderate number of evaluations overall, but a low number of credibility-related utterances proffered.

Killi et al. (2008) delved deeply into students' source evaluations, as emphasized in the CAEM, to produce student profiles corresponding to disengaged (e.g., disoriented readers, uncritical readers) and critical-analytic source users (i.e., versatile evaluators). Whereas Lawless and Kulikowich (1996) emphasize the degree of learner engagement (i.e., time spent on hypertext access, types of hypertexts accessed) in defining navigation profiles, Killi et al. (2008) emphasize the importance of source evaluation in defining profiles of students' multiple-text use. The CAEM unifies these two approaches in a single framework and attributes emergent profiles to a host of individual difference factors and their interactions, allowing for targeted learner development and intervention.

## FUTURE DIRECTIONS

The CAEM is certainly not the first model to suggest that discernible profiles may be identified in students' MSU (e.g., Alexander & DRLRL, 2012; Lawless &

Kulikowich, 1996; Reader & Payne, 2007). Nevertheless, the CAEM is comprehensive in associating individual difference factors, both cognitive and motivational, with the behaviors students manifest during MSU and their quality. There is certainly much work to be done in ascertaining the viability of this model. For one, although developed based on empirical evidence, the CAEM is only a theoretical model. As such, the proffered descriptions of students' MSU remain highly speculative in nature. Empirical investigations are necessary to specifically evaluate CAEM profiles, as well as the factors and processes upon which they are grounded.

In addition, the CAEM is limited in the variety of individual difference factors it considers, focusing on students' interest, attitudes, and source evaluation behaviors. Unquestionably, a host of factors, including prior knowledge, need for cognition, self-regulation and metacognition, and epistemic beliefs, have been identified as important for both single and multiple-text comprehension. In the future, we would hope to expand the person-centered factors examined in the CAEM, but for now the imperative is to test the model, as articulated, under varying conditions.

The latter point regarding varying conditions brings forward questions of setting, topics, and tasks. It is critical to ascertain whether the CAEM holds not only for laboratory-based studies, when topics are controversial and the catalogue of sources available pre-specified, but also for search tasks routinely undertaken in classrooms, when topics are more mundane and students are relatively free to locate sources on the Internet. Moreover, in light of the significance of motivational factors in the CAEM, it is imperative to explore patterns in MSU when individuals are free to engage in a task of their own choosing, for their own reasons. Such a contrast between other-given and self-directed MSU would be highly informative to both the CAEM and the broader literature on MSU. Indeed, the importance or value that students assign to different tasks would have important implications not only for their conception of task demands and assumption of a default stance, but also for their decisions about text access and cessation and ultimate task product.

Finally, existing models of MSU, including the CAEM, deal in a limited way with issues of development, including how these models may function for learners of differing ages as well as the nature of changes in individuals' MSU over time. Based on the extant literature, for example, there seems to be the expectation that the cognitive capacities necessary to evaluate conflicting points of view and make judgments based on evidence, independently, are more likely to emerge in late childhood or early adolescence (Hofer & Pintrich, 1997; Kuhn, 1999). However, with assistance and when working in an area for which they have sufficient background knowledge, even three- or four-year-olds can demonstrate a preference for trustworthy rather than unreliable sources (Koenig, Clément, & Harris, 2004). Additionally, research on false-beliefs has documented children's emergent conceptions of knowledge as potentially true or false (Chandler, Hallett, & Sokol, 2002) and intervention work has found that elementary students' evaluations of information sources can be developed (Macedo-Rouet, Braasch, Britt, & Rouet, 2013).

Considering these findings, the CAEM suggests that students, even at very young ages, are capable of engaging in processes associated with MSU when certain conditions are in place (e.g., familiar topic, limited and accessible sources, given students' age and reading level, and teacher scaffolding). While existing research has only

examined MSU in elementary-school populations to a limited extent (VanSledright & Kelly, 1998; Wallace, Kupperman, Krajcik, & Soloway, 2000), we suggest that limitations in students' MSU come less from developmental limitations, and more from the dearth of experiences that prime MSU.

### *Future Directions for Investigation*

Many empirical avenues exist for investigating the CAEM. We suggest two directions for initial research stemming from this model. First, students engaged in MSU should be surveyed or interviewed to be positioned in accordance with the default stances specified in the CAEM. The relative distinctions among and prevalence of students' default stances should be established and these should be connected with students' manifest source use behaviors. Second, the extent to which various default stance profiles may be engendered in students should also be explored. This could be done through careful topic selection or through more direct intervention, by including specific instructions assigning students to evaluate texts. The correspondence of these assigned default stance profiles to students' behaviors during MSU should then be investigated.

## INSTRUCTIONAL IMPLICATIONS

Despite the years of research that lie ahead for the CAEM, there are several instructional implications that presently warrant consideration. First, there is ample evidence that students do not often develop strategies, especially deep-processing strategies, without guidance (Paris & Winograd, 1990; Pressley & Afflerbach, 1995). That admonition applies to strategies required for locating, evaluating, and integrating texts from multiple sources as well (Bråten & Strømsø, 2011; Britt & Aglinskias, 2002). Given the growing presence of MSU in online and classroom contexts, it is advisable for teachers to explicitly instruct students in how to engage in effective online search, comprehend information, corroborate and evaluate sources, and monitor comprehension to support students in developing integrated representations of topics or issues based on multiple texts.

Related to the point of explicit instruction, it also seems wise for teachers to provide students with ample opportunities to engage in MSU. In this way, students become familiar and somewhat habituated to processing multiple texts (Brem et al., 2001). Yet, simultaneously students should have the chance to process multiple texts under varying conditions. In this way, they may come to recognize how differing topics or task parameters should translate into deviations in their default approach to MSU. This recognition, of course, is more likely to occur with teacher direction and modeling.

Finally, motivational and affective factors, which are a defining feature of the CAEM, are key to students' successful engagement in MSU (Bråten et al., 2014; Grossnickle, 2014). Pedagogically, therefore, teachers need to create learning conditions that should enhance the motivational and affective dimensions of MSU for students. The literature suggests several steps that teachers can take in this regard. For one, offering students a choice of the topic to be explored or a role in defining the task to be completed could stimulate investment in MSU (Wigfield & Cambria, 2010). In addition, when students perceive the tasks to be performed as directly relevant to their personal interests and experiences, the "value" of that task should increase (Gambrell, 1996; Hidi, 2001;

Wigfield & Guthrie, 2000). Greater commitment to and persistence with the task should follow from this added value (Ainley et al., 2002).

## CONCLUSION

We conclude this chapter by outlining a number of specific hypotheses that ought be evaluated in establishing CAEM validity. These include examining the role of motivational factors, namely topic interest and attitudes, in manifest source use behaviors (e.g., time on texts). Likewise, the CAEM demands an examination of the role of MSU evaluation skills and habits as they manifest during task completion (e.g., accessing document information). Most of all, the interactions among these motivational and cognitive factors need to be examined as evidence during task completion and through performance. To evaluate these hypotheses, there is a need to reliably assess students' (a) motivation for task completion, including individual interest and attitudes toward the assigned topic, and situational interest as arising through task completion, (b) skills and habits with regard to source evaluation and MSU, and (c) processing during multiple-text use. There is a corresponding need to examine varied data sources in assessing each of these constructs, including self-report (e.g., survey), behavioral (e.g., log data, eye-tracking), and cognitive (e.g., think-aloud) indicators. Finally, qualitative data may help us to understand underspecified aspects of the CAEM including students' expectations around cognitive products resulting from task completion, assumptions of a default stance, and decisions regarding MSU cessation.

In this chapter, the Cognitive Affective Engagement Model of Multiple Source Use is explicated. This model draws on earlier efforts in the MSU literature to describe the cognitive processes involved in students' engagement with multiple texts, as well as literature on single-text processing emphasizing the importance of motivational factors. Building on the extant literature, the CAEM introduces a three-step process characterizing students' MSU and identifies four profiles that depict students' typical pattern of interaction with multiple texts. Through its incorporation of motivational and cognitive factors in readers' interactions with multiple texts, and its consideration of task, externally given or personally formed, the CAEM serves as a valuable alternative to prior models. Of course, much more theoretical and empirical work is required to provide critical evidence for the viability of this new model, and to lay the groundwork for classroom-based interventions.

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