

INVESTIGATING UNDERGRADUATES' DEPLOYMENT OF STRATEGIES RELATED TO SELF TESTING, TESTING  
TAKING, AND ANXIETY IN TWO ONLINE ACCOUNTING COURSES

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by  
Gabrielle G. Griffin, B.A., M.A.T., M.Ed.



### **Abstract**

Metacognition is the knowledge and awareness about one's cognition (Garner & Alexander, 1989; Schraw, 1998). Successful learners use metacognition to control their cognition processes (Schraw, 1998) in various educational settings (National Academies of Sciences, Engineering, and Medicine, 2018). Metacognition drives cognitive learning processes (Schleifer & Dull, 2009) and is especially critical to student achievement in online learning modalities (Azevedo, 2009; Broadbent & Poon, 2015; Hacker & Bol, 2019; Lehmann et al., 2014; Veenman, 2007; Zimmerman & Moylan, 2009). This inquiry focuses on two asynchronous online accounting courses at a public commerce school in the southeastern U.S., wherein the instructor identified students who likely needed to improve their metacognitive strategies related to self-testing, testing, and anxiety with the Learning and Study Strategies Inventory (LASSI). Through comprehensive course reviews, learner surveys, and learner semi-structured interviews, this case study investigated how students deployed strategies related to self-testing, testing, and anxiety and to what extent the course design supported students' deployment of those strategies. Findings suggested that 1) these two courses are well-designed and provided ample resources and support for students to learn the content, 2) many students deployed self-testing and testing strategies in these courses, 3) many students experienced anxiety in these courses, and 4) the course structure and dialog may increase the transactional distance in these courses. These findings serve as the basis for recommendations in future course iterations.

*Keywords:* Metacognition, self-testing, test-taking, student anxiety, transactional distance

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Department of Curriculum, Instruction, and Special Education  
School of Educational and Human Development  
University of Virginia  
Charlottesville, Virginia

**APPROVAL**

This study, "Investigating Undergraduates' Deployment of Strategies Related to Self-Testing, Testing Taking, and Anxiety in Two Online Accounting Courses," has been approved by the Graduate Faculty of the School of Education and Human Development in partial fulfillment of the requirements for the degree of Doctor of Education.

Dr. Jennifer Chiu, Chair

Dr. Anne Jewett

Dr. Matthew Wheelock

Dr. Stephanie Conley

**Dedication**

To Briggs and Marvin—I wish you could see this.

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## Chapter 1: Introduction

### Statement of the Problem

Accounting is a dynamic and rapidly changing profession wherein professionals regularly encounter challenges without clear-cut solutions (Chen et al., 2017; Schleifer & Dull, 2009). For that reason, employers seek accounting candidates who possess professional knowledge and skills and have developed their metacognitive capacities to reflect upon and solve complex problems (Chen et al., 2017; Schleifer & Dull, 2009; Smith, 2001).

Cognition refers to thinking, and metacognition refers to thinking about thinking (Chick, 2019). In other words, cognition comprises the skills necessary to perform a task, while metacognition is the knowledge and awareness about one's cognition (Garner & Alexander, 1989; National Academies of Sciences, Engineering, and Medicine, 2018; Schraw, 1998). Successful learners use metacognition to control their cognition processes (National Academies of Sciences, Engineering, and Medicine, 2018; Schraw, 1998). Metacognition is also defined within three constructs: skill, will, and self-regulation (Weinstein et al., 2016). According to Weinstein et al., (2016): *skill* is knowledge of one's cognition and the strategies to identify, acquire, and construct meaning of new information, *will* is one's emotional and affective characteristics, including anxiety and willingness to exert effort to learn, and *self-regulation* is one's monitoring and control of one's own learning processes.

Since metacognition drives cognitive learning processes (Schleifer & Dull, 2009), it is critical to understand how accounting students deploy metacognition when learning in-person and online and how this deployment influences their achievement with different learning modalities. In a study exploring undergraduates' experiences pertaining to in-person and online accounting courses, Chen et al. (2017) reported an association between metacognition, cognitive effort, learning modality, and grade outcomes. Their results also indicated that students who self-regulated their learning in both modalities enjoyed a more positive course experience and earn higher grades, but many students also reported

having to exert more effort to succeed in online courses. Since adapting one's learning strategy to achieve success in various learning contexts requires metacognitive deployment (Garner & Alexander, 1989; National Academies of Sciences, Engineering, and Medicine, 2018; Schraw, 1998), it is critical to understand how to support learners' deployment metacognitive strategies within various learning contexts.

At a commerce school in the southeastern U.S., two undergraduate asynchronous online accounting courses designed for first-and second-year students—COMM 2010 and COMM 2020—are required prerequisites for admission to the school. Historically, these courses were offered in an in-person classroom format. However, to maintain instructional consistency and to free up limited classroom space, these courses gradually transitioned between 2016 and 2018 to become exclusively asynchronous online course offerings since the fall of 2018.

Over time, course GPA scores have remained stable since transitioning to an asynchronous online format (See Appendix A, Table 1). However, upon closer inspection, grade distributions within the COMM 2010 and COMM 2020 courses reveal more students earning A grades but fewer students earning A-, B+, and B grades in the online format compared to the in-person format. Also, more students earned a D+ or below in both online courses, and more students failed the online COMM 2010 course than the in-person course (See Appendix A, Table 2).

Currently, there are no data to inform the differences between the face-to-face and online grade distributions in both courses. However, the faculty member who oversaw the transition of the course format courses believes that younger undergraduate students likely struggle with learning basic accounting online and may find it easier to "give up" in an asynchronous course (personal communication, September 23, 2021).

To gain insight into COMM 2010 and 2020 students' metacognition, learning, and study strategies, the instructor integrated the Learning and Study Strategies Inventory (LASSI) during the

spring 2022 semester. The LASSI is a self-reporting instrument that evaluates "students' awareness about and use of study strategies related to *skill*, *will*, and *self-regulation*—their covert and overt thoughts, behaviors, attitudes, motivations, and beliefs that relate to successful learning" (Weinstein et al., 2016, p. 6). The survey comprises questions related to 10 scales, outlined in Table 1.1.

**Table 1.1**

*Learning and Studies Strategies Inventory (LASSI) Question Domains*

<b>Skill:</b> Strategies and skills to identify, acquire, and construct meaning from new information	<b>Will:</b> Emotional and affective characteristics, including anxiety and willingness to exert effort to learn	<b>Self-Regulation:</b> Managing and controlling learning processes
<ul style="list-style-type: none"> <li>• Information processing               <ul style="list-style-type: none"> <li>○ imagery</li> <li>○ verbal elaboration</li> <li>○ organization strategies</li> <li>○ reasoning skills</li> </ul> </li> <li>• Selecting Main Ideas</li> <li>• Test Taking Strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Anxiety: Degree of worry about school and academic performance</li> <li>• Attitude: Attitudes and interests in college and achieving academic success</li> <li>• Motivation: Diligence, self-discipline, willingness to exert effort</li> </ul>	<ul style="list-style-type: none"> <li>• Concentration</li> <li>• Self Testing<sup>1</sup></li> <li>• Time-Management</li> <li>• Using Academic Resources: Willingness to use learning or academic support centers when encountering problems</li> </ul>

*Note.* From LASSI 3<sup>rd</sup> Edition User's Manual 3<sup>rd</sup> edition, by C. E. Weinstein

After completing the LASSI, students received their results as separate percentile scores in each category (not an overall combined score) with the following interpretation guidelines:

- A percentile score between the 76<sup>th</sup>-100<sup>th</sup> percentile suggests the student has sufficient strategies in this area.
- A percentile score between the 51<sup>st</sup> and 75<sup>th</sup> percentile suggests the student may need to improve their strategies for academic success.
- A percentile score between 0-50<sup>th</sup> suggests the student likely needs to improve these areas to avoid serious problems with succeeding in college (Weinstein et al., 2016).

<sup>1</sup> The LASSI manual refers to the term "Self Testing" without a hyphen. In this paper, "Self-Testing" includes a hyphen.



The instructor collected LASSI data in both courses to compare with students' grades: 1) Spring 2022 COMM 2020 students with their corresponding fall 2021 COMM 2010 grades and spring COMM 2020 grades, and 2) Spring 2022 COMM 2010 students with corresponding spring COMM 2010 grades.

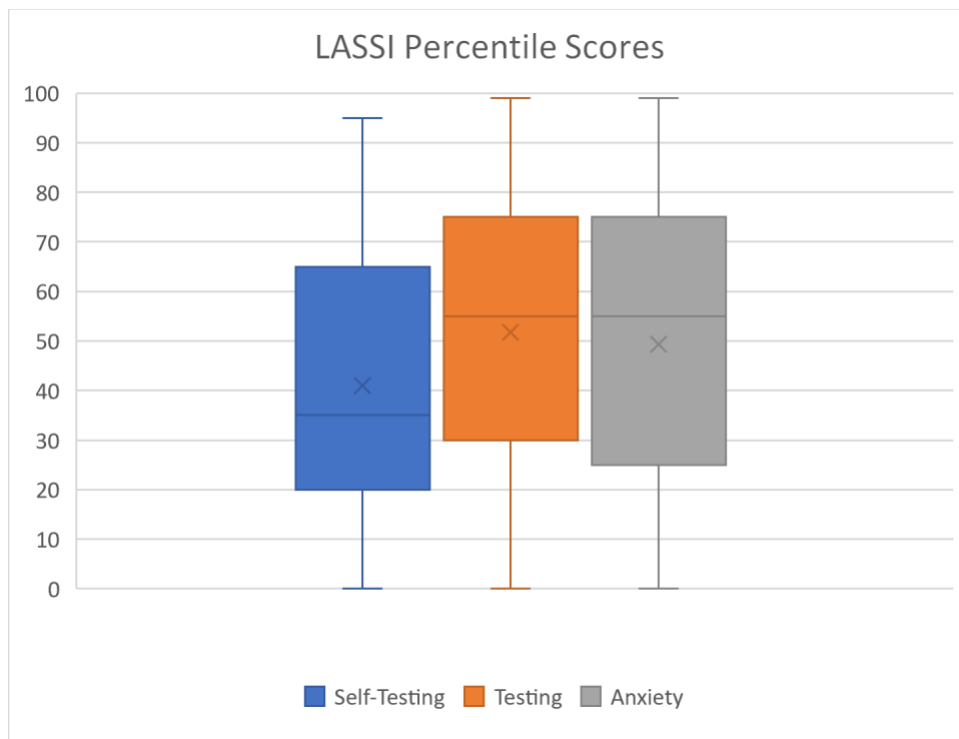
The combined COMM 2010 and COMM 2020 lowest LASSI percentile scores were *Using Academic Resources, Attitude, and Self-Testing* (See Appendix B, Table 1). However, data analyses revealed that *Anxiety* and *Testing* appeared to have the highest correlation with grades in both student groups. In addition, the overall correlations were lower than expected, and the lowest average LASSI percentile scores categories did not appear to correlate significantly with students' grades (Appendix B, Table 2).

As a result of these data and subsequent analyses, the school's instructional design team determined that the most critical LASSI categories impacting students' achievement in these courses were *Anxiety, Testing, and Self-Testing*. *Anxiety* and *Testing* were selected because of the correlation with grades. The instructional design team also selected *Self-Testing* because it was one of the lowest overall in terms of average percentile score and closely related to *Testing* (Appendix B, Table 1). The team also decided to investigate these three areas first and address the remaining LASSI domains later.

In fall of 2022, additional LASSI data indicated that many COMM 2010 students likely require support for *Self-Testing, Testing, and Anxiety*. 495 of 727 (68%) COMM 2010 students completed the assessment and results indicated half of the scores were at or below the 35<sup>th</sup> percentile in *Self-Testing*, and at or below the 55<sup>th</sup> percentile for *Testing* and *Anxiety*, see Figure 1.1 and Appendix B, Table 3.

**Figure 1.1**

Fall 2022 LASSI Percentile Scores in Self-Testing, Testing, and Anxiety for COMM 2010 (n=495)



### Conceptual Framework

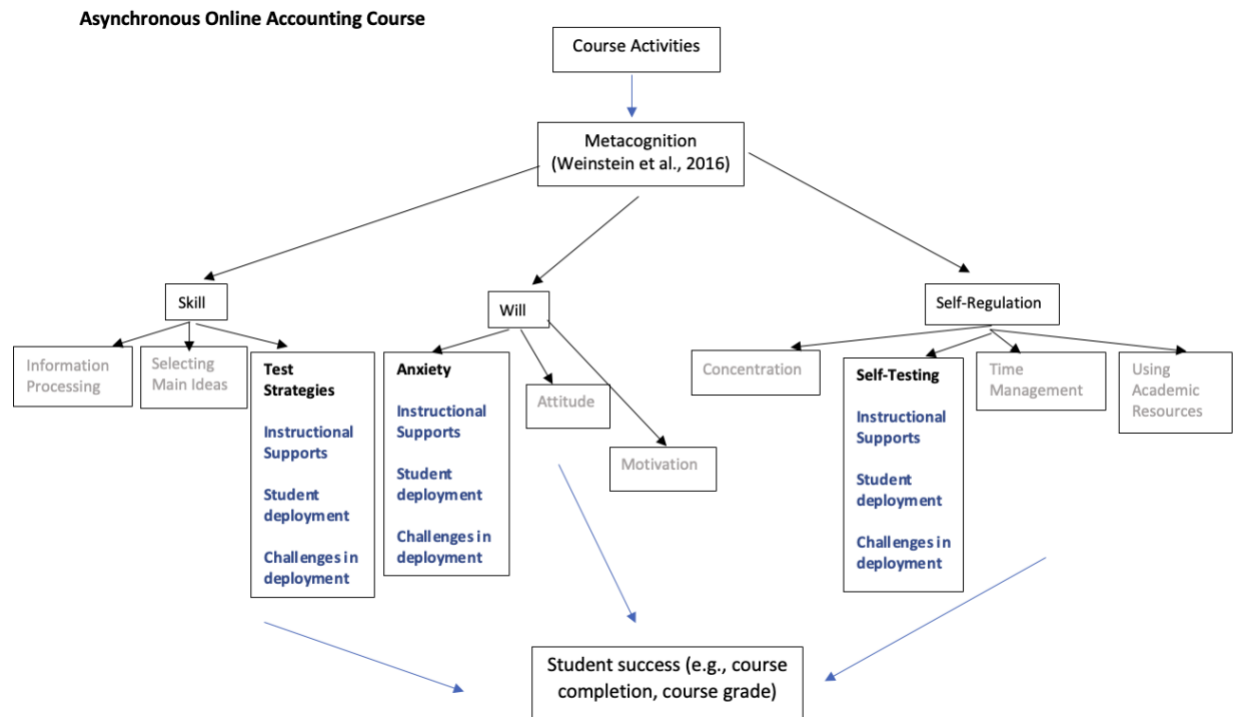
To better understand student experiences related to *Self-Testing*, *Testing*, and *Anxiety*, the conceptual framework (see Figure 1.2) was designed to categorize and organize this inquiry. This framework establishes the relationship between the elements and actions that ultimately lead to student success or failure within these courses. That is, cognitive activities students need to successfully complete course activities (readings, assignments, and exams) are driven by metacognitive skills needed to control these cognitive processes (Garner & Alexander, 1989; National Academies of Sciences, Engineering, and Medicine 2018, Schraw, 1998).

Weinstein's (2016) LASSI framework categorizes metacognitive processes into three classifications: *skill*, *will*, and *self-regulation*: *skill* refers to the processes in identifying, acquiring, and constructing meaning from new information, *will* refers to emotional and affective characteristics,

including anxiety and willingness to exert effort to learn, and *self-regulation* refers to managing and controlling learning processes. These three classifications comprise ten specific learning and study strategies (Figure 1.2).

**Figure 1.2**

*Conceptual Framework*



It is assumed that within COMM 2010 and COMM 2020, there exist both challenges and supports to students' deployment of metacognitive processes. For example, challenges unique to online learning, such as transactional distance—wherein “learners and instructors are separated by space and/or time” (Moore, 2013, p. 22), are well established in the literature (Broadbent, 2017; Kim et al., 2018; Moore & Kearsley, 2013). COMM 2010 and COMM 2020 students likely experience the effects of transactional distance in these large (700 +/- students) asynchronous courses. During the transition of these courses from in-person to online, the commerce school's instructional design team attended to high-quality online design principles to support and facilitate student success in these courses. Therefore, investigating how the course design specifically supports students' deployment of learning

and study strategies related to self-testing, testing, and anxiety management will be an important part of this study and will inform future course iterations.

### **Purpose of Study and Research Questions**

The historical COMM 2010 and COMM 2020 grade distributions and aggregate LASSI data suggest that many students need support with self-testing, testing, and anxiety management in these asynchronous accounting courses. This inquiry aims to understand students' experiences related to the deployment of metacognition and learning and study skills, as well as challenges and supports to such deployment existing within these courses. The following research questions will be investigated:

RQ1) How does the course design support students' deployment of learning and study strategies related to self-testing, testing, and anxiety within these asynchronous online accounting courses?

RQ2) To what extent and in what ways do students deploy learning and study strategies related to self-testing, testing, and anxiety in these asynchronous online accounting courses?

RQ3) What challenges do first- and second-year students experience in their deployment of learning and study strategies related to self-testing, testing, and anxiety within these asynchronous online accounting courses?

### **Significance of the Study**

Findings from this study will likely inform the commerce school of how to provide appropriate support to COMM 2010 and COMM 2020 students, which is a critical and required course for the school. In general, this study will also contribute to understanding how to support students' deployment of metacognitive processes in asynchronous, online learning environments.

### **Definition of Terms**

- **Anxiety** is how much students worry about school and their academic performance (Weinstein et al., 2016).

- **Cognition** is thinking; it comprises the skills necessary to perform a task (Chick, 2019). In this study, these skills are learning strategies related to self-testing, testing, and anxiety management.
- **Metacognition** is to think about thinking; it comprises knowledge and awareness about one's cognition (Garner & Alexander, 1989; Schraw, 1998). Successful learners use metacognition to control their cognition processes (Schraw, 1998) and how these processes work (National Academies of Sciences, Engineering, and Medicine, 2018). Metacognition is also thought of as three constructs: skill, will, and self-regulation (Weinstein et al., 2016). Skill refers to the knowledge of one's cognition and the strategies to identify, acquire, and construct meaning from new information. Will refers to one's emotional and affective characteristics, including anxiety and willingness to exert effort to learn. Self-regulation refers to one's monitoring and control of learning processes.
- **Self-Testing** is one's skills and use of comprehension monitoring through reviewing, paraphrasing, rehearsing, or formulating and answering questions to determine one's level of understanding, and is a subset of test preparation (Fiorella & Mayer, 2016a; Lynch, 2007; Weinstein et al., 2016).
- **Testing** is one's test preparation and test-taking strategies (Weinstein et al., 2016).
- **Transactional Distance Theory** is "a psychological and communications space to be crossed, a space of potential misunderstanding between the inputs on instructor and those of the learner" (Moore, 1993, p. 23).

## Chapter 2: Literature Review

This literature review presents existing research pertaining to challenges in online asynchronous learning, metacognitive theory, measuring metacognition, teaching and supporting metacognition in online asynchronous courses, online instructional design, considerations in accounting education, and students' use of learning and study strategies.

### Online Asynchronous Learning Challenges

While there are several affordances to asynchronous online learning, such as flexibility and accessibility to learning anywhere and anytime (Broadbent, 2017), there are also challenges that online instructors should consider in course design and delivery. One such obstacle is the theory of transactional distance, which is “a psychological and communications space to be crossed, a space of potential misunderstanding between the inputs on instructor and those of the learner” (Moore, 1993, p. 23). Transactional distance is inversely related to positive learning outcomes (Moore & Kearsley, 2013), and has been associated with student anxiety in online courses (Hauser et al., 2012), especially when learners complete quizzes or tests (Sato et al., 2019).

Moore, (1972, 1976) identified three “macro-factors” associated with transactional distance: structure, dialog, and autonomy. Structure refers to a planned set of learning activities (Moore, 2018), and as structure *increases*, the transactional distance *increases* (Moore, 1973). Highly structured courses are carefully organized, prescribed, and sequenced. In contrast, lower structured courses allow learners to choose what and how they will learn (Moore, 2018). As Moore (2018) describes, structure refers to the flexibility or rigidity of the learning sequence: “Since structure expresses the rigidity or flexibility of the course’s educational objectives, teaching strategies, and evaluation methods, it describes the extent to which a course can accommodate or be responsive to each learner’s individual needs and preferences” (p. 35).

Dialog refers to two-way communication between the instructor and learners (Moore, 2018), and as dialog *decreases*, the transactional distance *increases* (Moore, 1973). Course dialog can range from continuous to none, and its extent and nature are influenced by the number of students assigned to the instructor as well as the structure of the course (Moore, 2018). Moore (2018) identified additional factors determining the extent of course dialog, including “communications technology that link students and teachers...the abilities of students to manage their side of the dialogic process, the personality and interpersonal communication skills of the teacher, and cultural and even language differences between instructors and students” (p. 36).

Autonomy refers to the extent that learners can decide “about what to learn, how to learn, how much to learn” (Moore, 2018, p. 33). Moreover, “the level of autonomy required of the learner *increases* as transactional distance *increases* [emphasis added]” (Moore, 2018, p. 39). The relationship between autonomy and transactional distance seems to be rooted in structure and dialog, since both interact to the extent that learners are able (or unable) to manage their own learning (Moore, 1973, 1976). In other words, autonomous learners are more comfortable with highly structured course materials, less dialog, and choosing what and how to study (Moore, 2018). Therefore, since students’ ability to exercise autonomy varies, managing transactional distance requires knowledge about students’ abilities to manage their learning (Moore, 2018).

Another challenge is the increased cognitive load online learning creates for students. Online learning demands learners to distribute their limited processing capacity to acquire new knowledge and navigate digital environments (Schraw, 2007). In other words, online learning requires students to digitally function while also being “autonomously and actively engaged in the learning process” (Broadbent & Poon, 2015, p. 2). Such active engagement requires students to deploy cognitive learning skills while simultaneously deploying metacognitive skills to monitor and control their learning processes to achieve success.

The essentiality of metacognition to succeed in online learning environments is undisputed in the literature (Azevedo, 2009; Broadbent & Poon, 2015; Hacker & Bol, 2019; Lehmann et al., 2014; Veenman, 2007; Zimmerman & Moylan, 2009). Moreover, there are several metacognitive actions that successful online students share, including faithful goal setting and achievement (Kizilcec et al., 2017; Littlejohn et al., 2016; Zimmerman & Moylan, 2009), effective time management (Broadbent, 2017; Kim et al., 2018; You, 2015), active help-seeking (Hao et al., 2016), calibrated self-monitoring<sup>2</sup> and self-evaluation (Hacker & Bol, 2019; Littlejohn et al., 2016), and refined elaborating, i.e., integrating and connecting new knowledge with existing knowledge (Broadbent, 2017; Brown et al., 2017; Dunlosky et al., 2013). Therefore, supporting students' metacognitive development in online asynchronous courses may be critical to their success.

### **Metacognition**

As previously stated, *cognition* is thinking, and *metacognition* is thinking about thinking (Chick, 2019). In other words, cognition comprises the skills necessary to perform a task, while metacognition is the knowledge and awareness about one's cognition (Garner & Alexander, 1989; Schraw, 1998). Successful learners use metacognition to control their cognition processes (National Academies of Sciences, Engineering, and Medicine 2018; Schraw, 1998).

The literature offers several metacognitive models and theories, yet Flavell's (1979), and Schraw's (1998) theories align well with Weinstein et al.'s, (2016) LASSI framework (see Table 2.1). Flavell (1979) contends that the critical domains in metacognition are metacognitive knowledge and cognitive and affective experiences. Schraw's (1998) framework presents a different view than Flavell's by proposing that metacognition comprises knowledge of cognition and regulation of cognition without specific reference to affective experiences.

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<sup>2</sup> Hacker and Bol (2019) define calibration "as a measure of the degree to which people's subjective judgements of performance [and knowledge] correspond to their actual performance" ( p. 649).



Schraw contends that knowledge of cognition is one's self-awareness about cognition and includes three types of awareness: declarative, procedural, and conditional knowledge (Schraw, 1998; Schraw & Dennison, 1994). Declarative knowledge is *knowing about things*; procedural knowledge is *knowing how to do things*; and conditional knowledge is *knowing why and when to do things*, in other words, when and why to use declarative and procedural knowledge (Schraw, 1998, p. 114). Regulation of cognition is how students control their learning processes through three essential skills: planning, monitoring, and evaluation (Schraw, 1998). Planning is selecting strategies and allocating one's resources before starting a task (Schraw, 1998). Monitoring is one's awareness regarding comprehension and task performance (Schraw, 1998). Evaluating is "appraising the products and efficiency of one's learning" (Schraw, 1998, p. 115).

**Table 2.1**

*LASSI Domains and Metacognitive Theories*

<b>Skill:</b> Strategies and skills to identify, acquire, and construct meaning from new information (Weinstein et al., 2016)	<b>Will:</b> Emotional characteristics, including anxiety and willingness to exert effort to learn (Weinstein et al., 2016)	<b>Self-Regulation:</b> Managing and controlling learning processes (Weinstein et al., 2016)
<b>Knowledge of cognition</b> (Flavell, 1979; Schraw 1998) <ul style="list-style-type: none"> <li>• Declarative knowledge</li> <li>• Procedural knowledge</li> <li>• Conditional knowledge (Schraw, 1998)</li> </ul>	<b>Affective experiences</b> (Flavell, 1979)	<b>Regulation of Cognition</b> (Schraw, 1994) <ul style="list-style-type: none"> <li>• Planning</li> <li>• Monitoring</li> <li>• Evaluation (Schraw, 1998)</li> </ul>

In general, metacognitive theorists suggest that students who possess knowledge of cognition while simultaneously regulating their cognition will achieve higher learning outcomes. Indeed, Schraw (1998) argues that metacognitive knowledge and skills are critical for successful learning outcomes because they enable individuals to improve their cognitive skills and construct new skills to address their weaknesses, and apply these skills to future courses and across disciplines. Moreover, metacognition has been shown to be a stronger predictor of academic performance than general intelligence tests

(Veenman et al. 2004). Therefore, supporting students' development of metacognitive knowledge and skills is likely essential to their online achievement and future academic and professional success.

### ***Measuring Metacognition***

Metacognition is challenging to measure because learners are not always consciously aware of their metacognitive skills and knowledge (Flavell, 1987; Schraw, 1998; Schraw & Dennison, 1994).

Researchers use two measurement categories when investigating metacognition: objective behavior measurements (e.g., systematic observation and think-aloud protocols) and self-reporting instruments (Akturk & Sahin, 2011).

Think-aloud protocols provide unique insight into metacognitive processes and reveal the "why" of learners' thinking (Panadero et al., 2012; Sonnenberg & Bannert, 2019). However, think-aloud protocols can interrupt students' natural learning cadence as they are asked to stop, reflect and verbalize their thoughts and actions (Akturk & Sahin, 2011; Sonnenberg & Bannert, 2019). In addition, considerable time is needed to collect and analyze each participant's data (Panadero et al., 2012; Sonnenberg & Bannert, 2019).

In contrast to think-aloud protocols, self-reporting instruments provide a flexible mechanism for collecting data from large groups. Many studies have identified drawbacks to self-reporting instruments, such as social desirability bias, question misinterpretation, and response-shift bias (Howard, 1980; Rosenman et al., 2011). However, the advantages of self-reporting instruments, such as ease of interpretability and practicality, make them a favorite among researchers (Robins et al., 2007).

**Learning and Study Strategies Inventory.** The Learning and Study Strategies Inventory (LASSI) is a self-reported instrument developed by Weinstein et al. (2016). This assessment is designed to measure student metacognitive awareness about and use study strategies related to the skill, will, and self-regulation components of strategic learning. The 60 five-point Likert-type questions measure knowledge of cognition (Schraw, 1998), regulation of cognition (Schraw, 1998), and affective

characteristics (Flavell, 1979) (see Table 2.2). Weinstein et al. (2016) report high reliability for the instrument, with Cronbach  $\alpha$  coefficients ranging between .76 to .87 across the subscales. This inventory was developed specifically for college students, is administered entirely online, and automatically generates scores and feedback:

The LASSI is both diagnostic and prescriptive...It provides students with a diagnosis of their strengths and weaknesses, compared to other college students, in the areas covered by the ten scales; it is prescriptive in that it provides feedback about areas where students may be weak and need to improve their knowledge, skills, attitudes, motivations, and beliefs. (Weinstein et al., 2016, p. 6)

**Table 2.2**

*Learning and Studies Strategies Inventory (LASSI) Question Domains*

<b>Skill:</b> Strategies and skills to identify, acquire, and construct meaning from new information	<b>Will:</b> Emotional and affective characteristics, including anxiety and willingness to exert effort to learn	<b>Self-Regulation:</b> Managing and controlling learning processes
<ul style="list-style-type: none"> <li>• Information processing               <ul style="list-style-type: none"> <li>○ imagery</li> <li>○ verbal elaboration</li> <li>○ organization strategies</li> <li>○ reasoning skills</li> </ul> </li> <li>• Selecting Main Ideas</li> <li>• Test Strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Anxiety: Degree of worry about school and academic performance</li> <li>• Attitude: Attitudes and interests in college and achieving academic success</li> <li>• Motivation: Diligence, discipline, and willingness to exert effort</li> </ul>	<ul style="list-style-type: none"> <li>• Concentration</li> <li>• Self-Testing</li> <li>• Time-Management</li> <li>• Using Academic Resources* (help-seeking)</li> </ul>

*Note.* From *LASSI 3<sup>rd</sup> Edition User's Manual 3<sup>rd</sup> edition*, by C. E. Weinstein, D.R. Palmer, and T.W. Acee, 2016, pp. 7-10. \*Currently referred to as Study Aids.

### Teaching Metacognitive Knowledge and Skills

There is considerable literature pertaining to integrating general metacognitive teaching and learning strategies into online instruction. Such instruction is likely essential because, without it, students may overestimate their understanding of course content (Viberg et al., 2020) and fail to see

value in learning or using strategies. Furthermore, research indicates that students do not automatically use metacognitive strategies when learning online (Anthonysamy, 2021). Therefore, online accounting instructors should communicate the value of metacognitive knowledge and skills while offering instruction and scaffolded support (Anthonysamy et al., 2021; Zheng et al., 2019).

Schraw (1998) offers four ways to increase students' metacognition: by promoting awareness and importance of metacognition, improving students' knowledge of cognition, improving cognition regulation, and "fostering environments that promote metacognitive awareness" (Schraw, 1998, p. 118).

To promote their metacognitive awareness, students must first understand the difference between cognition and metacognition and how instructional interventions can help them improve their academic performance (Mountain et al., 2022). Online instructors can engage in teacher modeling, encourage peer modeling, provide students with opportunities for extended practice, and facilitate individual and group reflection (Schraw, 1998). However, instructors should model skills holistically because "too often teachers discuss and model their cognition i.e., how to perform a task, without modeling metacognition, i.e., how they think about and monitor their performance" (Schraw, 1998, p. 119).

To improve students' knowledge of cognition and cognition regulation Schraw (1998) recommends using prompts and checklists. Most online students will likely benefit from prompts to plan their learning and think about the "why" of the learning (Joseph, 2006; Karaođlan Yılmaz et al., 2018). When learning online, scripts, hints, guidelines, and questions can improve students' metacognition and knowledge-building (Chang, 2019; Karaođlan Yılmaz et al., 2018; Lehmann et al., 2014; Wong et al., 2019; Zheng et al., 2019), contribute to their self-control and self-observation skill development (Karaođlan Yılmaz et al., 2018) and enable them to recognize and address their learning gaps (Anthonysamy, 2021; Kim et al., 2018). For example, giving students a suggested daily study schedule could help them manage their time effectively. In addition, research indicates that learners with lower

subject-matter knowledge significantly benefit from pre-instruction planning prompts, e.g., “this new learning connects to what you already know in this way” (Lehmann et al., 2014). Moreover, directed prompting during lessons, e.g. detailing the how and why of each step to solving a multi-step problem, is another effective strategy for learners who struggle with problem-solving skills (Ifenthaler, 2012).

Cueing learners to use appropriate and generative learning strategies can help them develop sustainable metacognitive skills. As Lee et al. (2009) assert, "to generate relationships among or between new information and memory, learners need to rehearse, elaborate, organize and synthesize information...In doing so, learners become proficient in regulating their learning process" (p. 22).

While it is likely an effective strategy, some research suggests that prompting requires restraint because too much can yield unintended and adverse effects. In a study investigating whether metacognitive prompts impact declarative knowledge transfer in online learning environments, Schumacher and Ifenthaler (2021) found an association between embedded metacognitive prompting and learning performance while noting that undergraduate students felt annoyed by the prompts because they perceived them as disruptive to their learning. In a study investigating the sustainable long-term effect of metacognitive prompting, Sonnenberg and Bannert (2019) found that excessive online metacognitive prompting resulted in diminished learner effects over time. Similarly, Schumacher and Ifenthaler (2021) concluded that excessive prompting likely reduced learners' responsibility to maintain their learning processes. While metacognitive prompting can be effective, instructors should consider prompting as a scaffolding strategy, providing heavy support at the beginning of a course, and gradually diminishing prompts as the course unfolds to support learners' long-term metacognitive development.

Finally, to foster an environment that supports metacognitive development, Schraw (1998) advises instructors to promote active goal orientation within courses. Encouraging students to engage in active goal-setting is one of the most effective ways to support their time management (Kim et al., 2018)

and reduce procrastination (Wolters et al., 2017). By setting explicit mastery goals, instructors can cue students to choose various learning strategies, e.g. practice applying formulas to solve various math problems, or identifying the main ideas from expository text (Garner & Alexander, 1989; Joseph, 2006). However, instructors should be cautious about overemphasizing performance—inadvertently leading students to direct their efforts on performance over mastery (Schraw, 1998). Instead, instructors should focus on each student's current performance levels and reward their increased effort and persistence (Dweck, 2008; Schraw, 1998).

### ***Supplemental Metacognitive Instruction***

There is some evidence that supplemental online courses (learning experiences that are not associated with another course) could develop and support undergraduates' metacognitive awareness, strategy use, and academic performance (Ohtani & Hisasaka, 2018). Howlett et al. (2021) conducted an exploratory study to investigate the effects of academic coaching on undergraduate students' metacognition. The treatment groups were 1) in-person academic coaching, and 2) asynchronous online academic coaching. Results indicated that both in-person and asynchronous training increased students' metacognition during the training, and both modalities yielded similar results. This study contributes to the existing literature by demonstrating how students can be taught general metacognitive strategies and skills in asynchronous online learning experiences.

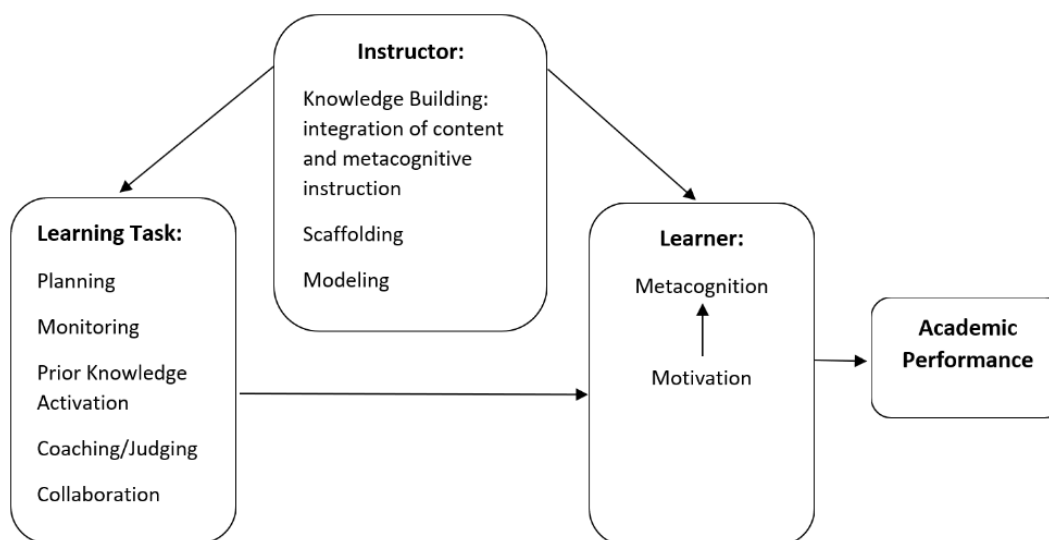
In two studies, Miller et al. (2020) sought to assess the impact of an asynchronous online learning module designed to target counterproductive beliefs about attention, learning, and memory. Results of the first study indicated that before completing the learning module, the college student sample was less accepting of counterproductive beliefs regarding attention and memory and suggested a propensity to engage in multitasking behaviors more than the community participant sample. Results of the second study indicated that participants in both samples who completed the training experienced positive effects regarding their counterproductive beliefs about attention, memory, learning, and their

own exceptionalism regarding multitasking. These studies also suggest that asynchronous online learning can produce a positive affective impact on an undergraduate audience.

### ***Shifting Responsibility to Learners***

Several researchers argue that heavy metacognitive support may not foster students' long-term skill acquisition and application (Marquès Puig et al., 2022; Miller et al., 2020; Mountain et al., 2022; O'Loughlin & Griffith, 2020; Schumacher & Ifenthaler, 2021). These researchers argue that instructors should instead approach metacognitive instruction in ways that develop students' habits of mind and long-term sustainability. Since greater responsibility for learning leads to successful learning outcomes (Anthonysamy, 2021), instructors should encourage students to become metacognitively aware and active in the learning process (Garrison & Akyol, 2015). Providing students with opportunities to leverage online learning tools to plan, structure, evaluate, and revise learning processes (Anthonysamy, 2021) and gradually shifting instructors' control over time, space, and pace of learning to students can help them become independent metacognitive learners (Shih & Huang, 2020), which is essential to the accounting profession (Chen et al., 2017; Schleifer & Dull, 2009).

Vrieling et al. (2018) offer a conceptual model (see Figure 2.1) for balancing metacognitive support with instructional planning. The authors argue that "under the ideal balance of student- and teacher control, [students'] use of metacognitive learning strategies and their motivation for learning is developed" (p. 696). This model illustrates how three perspectives influence a learner's academic performance: the learner themselves, the instructor, and the learning task, as well as how these perspectives are positively related (as represented by the arrows) (Vrieling et al. 2018). This model provides a visual representation of how online accounting instructors could support students in becoming independent metacognitive learners by shifting the impetus of learning tasks from external instructor cues to internal learner cues and actions.

**Figure 2.1***Shifting Metacognitive Development from Instructor to Student*

*Note.* Adapted from "Successful learning: Balancing self-regulation with instructional planning," by E. Vrieling, S. Stijnen, and T. Bastiaens, 2017, *Teaching in Higher Education*, 23(6), p. 688.

**Reflective Writing**

Reflective writing emerges from the literature as an effective strategy to develop and support students' metacognitive knowledge and skills. Furthermore, these exercises can assist both students and instructors—by helping students identify what they know, do not know, and need to learn, while also assisting instructors in identifying learning bottlenecks promptly (O'Loughlin & Griffith, 2020). This is especially important in online accounting education because students are introduced to new complex subject material that cumulatively builds upon previously assimilated knowledge, and it is crucial that instructors identify and ameliorate learning gaps quickly.

Two studies provide insight into how writing prompts can develop and support students' metacognition in online courses. Chang (2019) identified five general themes of how written reflection improved students' metacognition in an online course by helping them: increase their depth of knowledge, identify their knowledge gaps, personalize and contextualize their learning, understand how



their work compared to that of their peers, construct structural knowledge connections, and develop social connections with their peers. In another study, O'Loughlin and Griffith (2020) examined the impact of online reflective writing, i.e., blogs, on students enrolled in an undergraduate anatomy course. Based on their findings, the authors recommend assigning reflections regularly within a course, providing students with rubrics to communicate expectations, and grading reflections solely on thoroughness. However, the authors also caution that substantive instructor feedback requires considerable time. In addition, O'Loughlin and Griffith (2020) developed a model illustrating their theory about how reflective writing leads to learners' metacognitive growth, development, and independence (see Appendix C).

Research in accounting education also reveals a relationship between metacognitive writing exercises and increased learner comprehension (Smith, 2001). Reflective writing exercises can improve accounting students' comprehension (Almer et al., 1998; Theide & Anderson, 2003). Moreover, writing prompts can activate students' metacognition by providing them insight into their cognition, grasp of accounting concepts, and problem-solving capabilities (Myring et al., 2014).

Two studies investigated the impact of short writing exercises within in-person accounting courses. Almer et al. (1998) examined the impact of "one-minute papers" in an introductory accounting course. Participants were asked to answer two questions at the end of each class: "What was the main point you learned today?" and "What is the main unanswered question you leave the class with today?" (p. 490). The results suggested a significant link between the one-minute papers and increased quiz scores. While it can be argued that quizzes may not be an optimal measure of student learning, this study does suggest that short written reflection exercises can positively impact student achievement in an introductory accounting course. Baird et al. (1998) conducted a similar investigation within three undergraduate accounting courses and concluded that these writing assignments were "most beneficial to the students who are more likely to have difficulty in the class" (p. 270). Struggling students may have

benefitted from these exercises because freewriting can ameliorate their deficiencies with self-monitoring and self-explanations (Chi et al., 1989). Moreover, the benefits of writing exercises were most evident for more complex and less familiar accounting topics (Baird et al., 1998).

It is also important to note that the timing of metacognitive writing exercises may be critical in online courses. In two experiments, Theide and Anderson (2003) examined if learners' accuracy of comprehension monitoring was improved by summarizing texts. Results from both experiments indicated that the delayed summary group experienced the greatest meta-comprehension accuracy and suggest a relationship between delayed summarization exercises with greater comprehension and test performance. Therefore, undergraduate online accounting students may experience a benefit from summarization writing exercises that occur sometime after learning activities.

### ***Instructional Design***

Research suggests that best instructional design practices are essential for developing and supporting students' metacognition in online learning spaces. Peck et al. (2018) concluded that sound instructional design principles accompanied by high-value tasks and aligned learning strategies are essential for online learning design. Organization and completeness of class materials are also critical; without face-to-face interactions with their instructor, online students depend heavily on the efficient delivery of learning materials to meet class requirements (Hauser et al., 2012). In addition, best online design practices offer strong learner support (see Appendix F: Quality Matters, 2020). Highly organized course content and delivery, integrated support and guidance for digital learning tools (Kim et al., 2018), and embedded reminders about upcoming assignments and tests (Kim et al., 2018) can also facilitate students' metacognition and time management.

**Transactional Distance.** Transactional distance hinges on three elements: structure, dialogue, and autonomy (Moore & Kearsley, 2013). Structure is the rigidity/flexibility of the course design, including learning objectives, activities, media, and customizable content (Quong et al., 2018). Dialogue

is the purposive interaction between the instructor and students; fewer interactions result in greater transactional distance (Moore & Kearsley, 2013). Moreover, learners likely require peer interaction to co-create knowledge (Goel et al., 2012). Autonomy is how much learners can personalize their experience within the course structure, and “dialogue seems to be the foundational element of this theory of structure, dialogue, and learner autonomy” (Quong et al., 2018, p. 81). Therefore, to lessen transactional distance in asynchronous online courses, it is critical to integrate meaningful points of instructor-learner and learner-peer dialogue.

To that end, instructors and designers should create online learning communities that attend to four essential interactions: learner-to-content, instructor-to-student, peer-to-peer (Moore, 1989) and learner-to-technology interface (Quong et al., 2018). While this review has addressed learner-to-content interaction, instructors and designers should also ensure that learners can successfully navigate the course and use online learning tools (Quong et al., 2018). But, as previously mentioned, learner-to-instructor and learner-to-peer interactions are especially critical in online asynchronous modalities. To facilitate course dialog, discussion forums have become ubiquitous elements in online courses. But, in large online courses, conventional online discussion boards would quickly become unwieldy and overwhelming for the learners and the instructor. Instead, methods to engage many students efficiently and simultaneously might be a better solution. For example, in their study, Quong et al. (2018) found that a closed social networking platform integrated into an online course appeared to enhance social, teaching, and cognitive presence by allowing “students to process the content for themselves in the presence of the instructor and other classmates” (p. 96). Moreover, this platform also resulted in “an organic development of learner-learner, learner-instructor, and learner-content interaction and created a knowledgable learner-interface relationship” (p. 96).

**Metacognition.** Supporting instructor-learner and learner-peer interactions may also support learners’ metacognition. Research suggests that the depth of interactions within these relationships

influences learners' self-efficacy and self-motivation, which are likely subprocesses of metacognition (Cho & Shen, 2013). Online instructors should therefore build and manage positive working relationships with students by serving as course facilitators and guides (Fajardo, 2014), providing timely and elaborative feedback to learners (Cho & Shen, 2013), especially before they complete exams (Sato et al., 2019), and facilitating peer interactions (Jumaat & Tasir, 2016; Schraw, 1998; Shih & Huang, 2020). Peer-to-peer interaction, specifically in the forms of tutoring, feedback (Paris & Paris, 2001), and assessment, appears to support learners' metacognitive growth. Therefore, a deliberate approach to online course design that facilitates instructor-to-learner and learner-to-peer dialog and constructive interaction would likely support students' metacognitive development.

It is important to note that current literature also reveals mixed evidence about the role of metacognition in academic achievement, including questions about the sustainability of behavioral changes resulting from instructional interventions. Some studies suggest that metacognitive activities have little to no effect on academic achievement (Marquès Puig et al., 2022; O'Loughlin & Griffith, 2020). Moreover, questions remain as to whether instructional interventions result in long-term sustainable changes in metacognitive behaviors or academic achievement (Miller et al., 2020). These studies were highly contextual and small in scope ( $n = 92-123$ ), but their results signal the need for additional research to help resolve these questions. However, the balance of the reviewed literature in this inquiry indicates a significant positive relationship between metacognition and academic achievement.

### **Considerations in Online Accounting Education**

Several studies specifically address the essentiality of metacognitive support in both in-person and online accounting education. Schleifer and Dull, (2009) found an association between metacognition and enhanced deductive reasoning, problem-solving, and course grades within in-person accounting courses. In comparing student experiences between in-person and online courses, Chen et al. (2017)

found that course delivery mode, self-regulation, and cognitive effort interacted “that is, the association of each with the expected grade depend[ed] on the other two” (p. 46) in both in-person and online accounting courses. In addition, the results indicated that a student's self-regulating ability and cognitive effort were associated with a more positive course experience in both modalities, but students also reported having to exert more effort to succeed in online courses. Mountain et al. (2022) found that providing students with clear assessment criteria and exemplars in online courses can reduce students' test anxiety in online courses. In addition, instructor feedback is likely critical in developing students' long-term self-regulatory skills. However, Mountain et al. (2022) did note concerns about the significant level of support needed to develop students' self-regulation and questioned the sustainability and application of these skills beyond the course.

To address these long-term sustainability concerns, online accounting educators might be better positioned to develop students' independent deployment of metacognitive strategies. To that end, instructors should not approach metacognition as “one and done” exercises, nor should accounting faculty expect students to become better metacognitive learners simply from more experience in the online learning (Wandler & Imbriale, 2017). Instead, accounting instructors should address these skills throughout courses and curate a repository of readings, videos, and blogs about how to succeed in online coursework. These resources should address metacognitive, motivational, and cognitive strategies that guide students in developing their own plans (Wandler & Imbriale, 2017). Lento (2018) also advises educators to link course assessments with student usage of learning resources. This way, instructors can incentivize students to interact with materials and learning activities regularly. Finally, online resources should also be dynamic—activating both the auditory and visual channels. For example, one study found that dynamic learning resources were more positively associated with final exam performance than static visual-only materials (Lento, 2018). Furthermore, resources such as pre-recorded lectures allow students to review videos as many times as they need (Myring et al., 2014).

These studies identify specific accounting instructional practices to support students' long-term metacognitive development and deployment.

### ***Metacognitive Calibration***

Researchers define metacognitive calibration "as a measure of the degree to which people's subjective judgments of performance [and knowledge] correspond to their actual performance" (Hacker & Bol, 2019, p. 649). Since accounting requires professionals to make judgments when problem-solving (Schleifer & Dull, 2009), accounting students should be able to accurately calibrate and make necessary adjustments to ameliorate their own learning gaps. These actions are even more critical in asynchronous online accounting courses since students must successfully self-direct and manage their learning processes (Moore, 2013).

In the COMM 2010 and 2020 courses, McGraw Hill publishers offer the LearnSmart adaptive learning system to support students' calibration development. This system integrates the e-textbook with content questions, videos, and calibration activities.<sup>3</sup> Zhao and Ye (2020) conducted a cross-sectional study with college students using the LearnSmart system in an introductory information systems course to examine the relationship between students' metacognitive calibration with the LearnSmart system and course achievement. Results indicated that higher calibration led to higher student achievement while reducing time spent on assignments and suggest that the LearnSmart system may help develop and support students' metacognitive calibration.

### **Students' Use of Learning and Study Strategies**

The following sections present research studies pertaining to the specific learning and study strategies assessed by the LASSI. Most of these strategies have been extensively studied, and by no means does each strategy receive an exhaustive review. Instead, the research presented was

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<sup>3</sup> McGraw Hill LearnSmart e-book and activities are integrated into the COMM 2010 and 2020 courses.

deliberately selected to provide insight into how accounting students can successfully deploy each of these learning strategies when learning online. Each section also includes ways instructors can help students develop and deploy these strategies in online courses. Many studies presented below are recent (within the past eight years) but older, seminal studies are also referenced. This section is organized and presented following the LASSI's skill, will, and self-regulation components of strategic learning.

### ***The Skill Component of Strategic Learning***

The skill component comprises learners' strategies and skills to identify, acquire, and construct meaning from new information (Weinstein et al., 2016). These strategies and skills include information processing (i.e., imagery, verbal elaboration, organization strategies, and reasoning), selecting main ideas, and testing strategies.

The self-directed nature of asynchronous online modalities necessitates that learners manage their own learning. Therefore, students should independently and competently choose appropriate learning strategies, manage their time, and actively seek ways to ameliorate their own learning gaps across various disciplines. Moreover, in accounting education, students should develop problem-solving skills to address challenges without clear-cut solutions (Chen et al., 2017; Schleifer & Dull, 2009), and selecting appropriate strategies to address different knowledge types is an essential learning and problem-solving skill.

**Information Processing.** Information processing is using imagery, verbal elaboration, organization strategies, and reasoning to learn more information and skills (Weinstein et al., 2016).

**Imagery.** When students employ imagery techniques to learn, they create mental images to depict factual knowledge (Fiorella & Mayer, 2016) procedural steps (Cooper et al., 2001). Researchers have demonstrated how the use of imagery may enhance generative learning processes. Investigating working memory and visuospatial abilities (Gyselinck et al., 2009) found a distinct knowledge processing

advantage for those students who utilized imagery strategies. In a later study, Leopold and Mayer (2015) investigated the effects of mental imagery prompts when learning complex written material. Results suggested that providing imagery prompts in conjunction with written text can “affect deeper levels of understanding of explanative text, as shown in superior transfer performance” (p. 19).

**Verbal elaboration.** Verbal elaboration is related to self-explaining, wherein students mediate self-instruction by selecting salient information and explaining it to themselves when learning (Fiorella & Mayer, 2016). Chi et al., (1989) investigated how undergraduates construct explanations from domain knowledge, the nature of these explanations, the relationship between understanding and constructed explanations, and the nature of their understanding after “instantiating the example” (p. 147). Results indicated skilled students produced a significantly greater number of self-explanations and demonstrated deeper understandings as compared to unskilled students. Furthermore, skilled students accurately monitored their comprehension shortcomings and successes when studying and used examples during problem-solving.

As demonstrated by Chi et al., (1989), self-explanation strategies likely transcend expository text. Renkl et al. (1997) investigated how example variability and sophistication of self-explanations of worked-out examples could foster transferrable knowledge. Results suggested that individuals who elicited self-explanations resulted in greater knowledge transfer as compared to individuals who did not elicit any self-explanations. These results also align with previous literature on the relevance of self-explanation quality while learning from worked-out mathematical examples. Indeed, self-explanation strategies could be an effective way for undergraduates to summarize other types of procedural knowledge--such as complex accounting computations.

Overall, there is significant evidence that self-explanation assists students in generative knowledge-building across subject domains. Wylie and Chi, (2014) concluded that self-explanation is most effective in helping students build mental models of complex conceptual knowledge. However,



Dunlosky et al., (2013) point out that with a few exceptions, nearly all self-explanation studies measure its effects within minutes of learning, and “the durability of self-explanation effects is woefully underexplored” (p. 13). Therefore, subsequent research should address the sustainability of knowledge building through self-explanation.

**Organization.** Research studies across age groups and knowledge domains indicate that learning by constructing, modifying, or viewing concept maps can be an effective learning strategy (Nesbit & Adesope, 2006). In a study investigating the effectiveness of concept mapping for college-aged students, Chularut and DeBacker (2004) found that students who used concept maps appeared to make greater learning gains than students in the control group. Moreover, the researchers found that these same students outperformed the control group on self-monitoring, knowledge acquisition strategies, and self-efficacy measures. In a later study comparing standard note-taking with completing a graphic organizer, Ponce and Mayer (2014) employed eye-tracking technology to compare each group’s cognitive processing when learning new material. Results indicated that participants who used graphic organizers experienced a deeper understanding of the material as compared to the notetaking group. The researchers also noted that participants who took written notes appeared to learn linearly—that is, they processed new learning in the order it was presented, as compared to participants who used graphic organizers who appeared to learn generatively--that is they appeared to process new learning by looking for specific connections within the material. The results of these studies suggest that organizing new learning with concept maps can be an effective learning strategy for college-aged online students.

**Reasoning.** Reasoning or critical thinking is “purposeful, self-regulatory judgment that results in interpretation, analysis, evaluation, and inference, as well as explanations of the considerations on which that judgment is based” (Abrami et al., 2015, p. 275). Research indicates that dialogue, real-world problem-solving, and mentoring develop and support students’ critical thinking skills (Abrami et al., 2015). In a qualitative study exploring undergraduates’ critical thinking development, (Yuan et al., 2020),

recruited participants to work as research assistants. The study's findings indicated that participants' engagement with "workshop learning, individual and collaborative analysis, group consultation, presentations, and critiquing" (p. 37) appeared to enhance their analysis, categorization, and interpretation skills. Moreover, participants reported transferring these skills to their own professional contexts.

In a mixed-methods study aimed at identifying course components that develop undergraduates' ability to develop and write supported arguments Öberg et al., (2022), identified five instructional design features that cued metacognitive actions while also enhancing students' reasoning skills: 1) integrating formative peer review and requiring students to explain how they used feedback, 2) using strategic instructional scaffolding, 3) aligning terms and concepts with learning objectives, assignment directions, and assessments, 4) providing detailed formative and summative rubrics linked to learning objectives, 5) developing a list of research topics addressing unresolved research questions.

***Information Processing Strategies.*** The studies referenced support existing literature and provide general strategies supporting and developing students' information processing skills with imagery, verbal elaboration, and organization. Prompt students to visualize facts (Fiorella & Mayer, 2016) or procedural steps Cooper et al., (2001). Direct students to verbally elaborate on new or complex material by self-explaining complex concepts or working through the procedural problem steps (Chi et al., 1989; Renkl et al., 1997). Integrate graphic organizers and concept maps into learning activities (Chularut & DeBacker, 2004; Nesbit & Adesope, 2006; Ponce & Mayer, 2014).

To support students' reasoning skills, instructors can provide direct critical thinking instruction, practice, and support, to train students in recognizing reasons and unstated assumptions; drawing appropriate conclusions, appraising evidence, evaluating statements, and judging conclusions (Thomson, 2013). In addition, instructors can also use a scaffolded process approach with ample opportunities for student interaction, discussion, and debate (Öberg et al., 2022; Yuan et al., 2020),

integrate elaborative instructor and peer feedback (Öberg et al., 2022; Thomson, 2013) and align course outcomes with assignments, assessments, and detailed rubrics (Öberg et al., 2022).

**Selecting Main Ideas.** Selecting main ideas or summarization is one's ability to discern key points and supporting details when learning or studying (Dunlosky et al., 2013; Weinstein et al., 2016). While most educators likely believe summarization is a highly effective learning strategy, its actual utility is elusive to quantify because research studies have implemented it in different ways; yielding mixed results (Dunlosky et al., 2013). However, one emergent theme from the literature is that summarization is likely an effective strategy for undergraduates who have acquired the skill earlier, i.e., during middle and high school (Dunlosky et al., 2013).

Two classic studies demonstrated the efficacy of summarization. In a study aimed to contrast the efficacy of different notetaking techniques, Bretzing and Kulhavy, (1979) concluded that notetaking, either by summary or paraphrasing, can facilitate student recall through meaningful encoding and semantic processing. Later, Garner, (1982) investigated the relationship between effective summarization and delayed recall and found that students who wrote summaries containing more accurate and essential information demonstrated greater recall than those students who wrote subpar summaries. These studies suggest that summarization is a valuable learning strategy for undergraduates who have already attained these skills. However, students without prior experience will need to learn these skills and may require interventional support and scaffolded practice to effectively summarize expository text.

**Selecting Main Ideas Strategies.** The results of these studies align with more recent literature and provide two general strategies for teaching summarization and self-explanation. First, instructors can model to students how to summarize or paraphrase short, expository texts or lectures by restating the main idea in their own words (Bretzing & Kulhavy, 1979; Brown et al., 2017; Fiorella & Mayer, 2016a; Garner, 1982). Second, instructors can model and coach students to adopt self-explanation

strategies while reading and studying. Instructors can direct students to ask themselves, “Does this make sense?” (Fiorella & Mayer, 2016) and pause to self-explain (out loud if possible) when failing to comprehend complex reading material (Chi et al., 1989).

**Testing Strategies.** Testing Strategies refer to test preparation and test-taking strategies.

Two older studies investigated the impact of test-wiseness on students’ test scores. Dolly and Williams (1986) investigated if students with low content knowledge can use deductive reasoning skills to choose correct answers by exploring if this type of “test-wiseness” can be taught and generalized by undergraduate students. One treatment group received instruction addressing cognitive test-taking strategies: cue-based, including length of option, middle value, similarity or oppositeness of options, and stem question cues. The control group did not receive any “test-wiseness” instruction. Results indicated that the treatment group significantly outperformed those in the control group on the test-wiseness items. Rogers and Bateson (1991) sought to empirically assess the influence of test-wiseness on Canadian high school seniors’ exit examinations. The researchers defined faulty multiple-choice questions as opportunistic items that allowed low-content knowledge students to correctly guess the answer by using deductive reasoning or cue-based question strategies. Results revealed that when students possess partial knowledge regarding the item and test-wiseness, there is a higher probability that the student will choose the correct answer on faulty items. The results from both studies suggested that students who have both test-taking skills and content knowledge will likely perform best on subject-specific tests.

### ***The Will Component of Strategic Learning***

The will component is students’ emotional and affective characteristics (Weinstein et al., 2016) and includes anxiety, attitude, and motivation. Anxiety is the degree of students’ worry about school and their academic performance. Attitude is students’ interest in college and achieving academic success. Motivation is students’ diligence, discipline, and willingness to exert effort to achieve success.

Student challenges with transactional distance can be more acute in asynchronous than synchronous contexts because learners can feel more disconnected and isolated from the instructor and their peers (Karaoglan Yilmaz & Yilmaz, 2021; Moore, 2013). In addition, since students' motivation to learn online likely decreases over time (Karaoglan Yilmaz & Yilmaz, 2021), it is essential that learners develop emotional resilience, self-efficacy, and motivation to achieve success in asynchronous online courses.

**Anxiety.** Anxiety is how much students worry about school and academic performance (Weinstein et al., 2016). Anxiety, which is often accompanied by depression, is reaching epidemic proportions on college campuses, and trends indicate that it will continue to increase (Colarossi, 2022). In a recent study, Asher BlackDeer et al. (2021) sought to quantify the prevalence of depression and anxiety among college students. The researchers analyzed aggregated data from four National College Health Assessment (NCHA) administrations across the U.S. and Canada between 2008-2009 (n=117,430). The sample comprised undergraduate students, nearly two-thirds female and about 20 years old. Nearly three-quarters of the sample were white; Asian, Black, and Latinx each comprised 5-8% of the overall sample. Results suggested that anxiety (9.2%) and depression (8.7%) were the most common conditions that students were diagnosed or diagnosed and treated. Furthermore, these participants who reported anxiety also reported experiencing overwhelming anxiety (48.98%), receiving treatment for depression (17.87%), and receiving treatment for anxiety (12.91%).

**Test Anxiety.** While many students suffer from generalized anxiety, there is likely a significant number who suffer from test anxiety—impacting their performance. “Test anxiety is manifested by a range of cognitive deficits, starting with the original learning of the information, continuing during the organization of the information while reviewing it, and ending it with retrieving it on the examinations” (Naveh-Benjamin, 1991, p. 138). Whatever the cause, there is ample evidence that many college

students struggle to maintain their mental health, which can negatively impact their academic achievement.

In an investigation of highly test-anxious students, Naveh-Benjamin et al. (1987) conducted two observational studies to objectively determine how students organized course material in non-evaluative situations. This study diverged distinctly from previous research as it relied on observations instead of students' self-reports. Results from both experiments supported the researchers' previous claims that test-anxious students experience information retrieval problems while taking tests and in the other stages of information processing, particularly in organizational processes. The results of the second experiment also indicated that test-anxious students could be differentiated by their study habits. The researchers concluded that test-anxious students with good study habits might only have problems with retrieval during tests. In contrast, test-anxious students with poor study habits might not sufficiently encode or organize information while learning, thus experiencing difficulties in all stages of information processing.

In a later study testing the hypothesis that high anxiety is associated with inferior performances on learning and memory measures, Cassady (2004) conducted two experiments to examine the effects of cognitive test anxiety on students' memory, comprehension, and understanding of expository texts. Results from both experiments confirmed the expectation that students' high levels of test anxiety may have led to their inferior performance on evaluative tests and indicated a strong correlation between students' self-reported study habits and test anxiety. Since these experiments were carried out in controlled conditions, the negative impact of evaluative pressure on students may be even more significant during authentic testing situations. Nonetheless, Cassady's results provide additional evidence supporting the information processing perspective and impact offered by Naveh-Benjamin et al. (1987).

Results from two other studies suggested a relationship between test anxiety and performance on timed tests. In their study, Onwuegbuzie and Seaman (1995) found that both low- and high-anxious students performed better on an untimed final statistics exam than the timed treatment group. Suggesting a relationship between anxiety, motivation, and attention, the researchers reported that “differences between high- and low-anxious students in evaluative situations are caused by differences between them in motivational disposition and attentional focus” (Onwuegbuzie & Seaman, 1995, p. 115). Similarly, results from Orfus' (2008) study suggested that test anxiety and time pressure affected participants' cognitive performance, and participants with lower test anxiety performed significantly better than those with high test anxiety on a timed math test.

***Managing Anxiety.*** Research and recent news reports indicate that many undergraduates likely experience mental health struggles during their collegiate experience (Colarossi, 2022). This issue has led researchers to investigate ways to help students cope with the symptoms of anxiety and depression and ameliorate the potentially devastating effects.

As a follow-up to the Naveh-Benjamin et al. (1987) study, Naveh-Benjamin, (1991) tested the effectiveness of different training programs designed to assist students in managing their anxiety. Results indicated that “desensitization” training (i.e., relaxation techniques followed by gradual exposure to stressors to build resilience) was most helpful to students who experienced problems with retrieval during tests. On the other hand, study skills training was most helpful to those students who experienced information processing problems. While these results provided support for the researcher's claims that deficits in retrieval and information processing (encoding and organization) might be a cause for poor test performance for highly test-anxious, the results also indicated that a one-size-fits-all approach to anxiety management might not serve a wide range of student needs.

In a later study examining the effectiveness of various interventions for helping highly anxious math students regulate their emotions before a timed math test, Brunyé et al.'s, (2013) results indicated the value of focused breathing techniques to combat math test anxiety:

The most compelling result was found when math-anxious participants performed a focused breathing exercise immediately prior to the arithmetic test. After the exercise they showed a 9% boost in accuracy relative to the worry exercise (and a 6% boost relative to the unfocused breathing condition), allowing them to approach the performance levels of participants with low math anxiety. The focused breathing exercise was specifically designed to reduce feelings of anxiety and aid in the effortful control of attention, allowing participants to focus on something other than the negative emotional thoughts about the math test. (p.5)

Recently, university mental health professionals and educators have turned to mindfulness-based interventions to help students manage their stress and anxiety and maintain their emotional well-being. These offerings are designed to help learners develop non-judgmental awareness and by controlling their attention to the present moment with “curiosity, openness and acceptance” (Hofmann & Gómez, 2017, p. 740)

Researchers have investigated the effectiveness of both in-person and asynchronous mindfulness interventions for undergraduate students. Lever Taylor et al., (2014) found that asynchronous training based on therapist-led interventions may be effective for large undergraduate populations. Long et al. (2021) tested the effects of a face-to-face mindfulness-based program and found that participants experienced increased emotional resilience through increased executive function, coping, social connectedness, and self-compassion.

The literature reveals four general strategies for supporting undergraduates' mental health needs to help manage anxiety. First, academic programs can support test-anxious students with learning skill development anxiety management services (Naveh-Benjamin, 1991; Naveh-Benjamin et al., 1987).



Second, students can also learn mindfulness meditation techniques (Bamber & Schneider, 2022; Lever Taylor et al., 2014; Long et al., 2021) and build emotional resilience through cognitive-based emotional regulation training (Long et al., 2021). In turn, an increased emotional resilience should prepare undergrads to approach and address academic stressors directly and not avoid them (Long et al., 2021). Third, mental health programs can be delivered in a face-to-face or asynchronous format to support online learners (Lever Taylor et al., 2014; Long et al., 2021). Finally, any program must include ways students can easily connect with campus mental health providers to access higher levels of support (LeBlanc & Marques, 2019).

**Attitude Strategies.** Attitude comprises students' attitudes and interest in college and achieving academic success. Tinto's (2017) model supports the existing literature and offers four strategies to help undergraduates develop and maintain a positive academic attitude. First, instructors can prompt students to clearly articulate their goals for attending college, and tap into students' goals by making explicit connections between course learning goals and real-world applications (Tinto, 2017; Yeager et al., 2014). Second, academic support programs, supplemental instruction, and corequisite remediation can help first and second-year students develop their self-efficacy—especially first-generation students and students from historically underrepresented populations (Shine et al., 2021; Tinto, 2017). Third, instructors can integrate learning activities that require peer interaction, as well as ones that are representative of students' lived experiences (Tinto, 2017). Finally, instructors and advisors can encourage students to join campus groups and clubs to foster their sense of belonging (Shine et al., 2021; Tinto, 2017).

**Motivation.** Motivation comprises "students' diligence, self-discipline, and willingness to exert the effort necessary to complete academic requirements" (Weinstein et al., 2016, p. 9). The constructs of motivation are related to attitude (above), and researchers have studied motivation and its constructs

extensively, especially in terms of intrinsic motivation—the natural propensity to learn, and extrinsic motivation—the desire to attain an external goal (Ryan & Deci, 2000).

Two studies provide insight into the relationship between motivation and metacognition, in both traditional and online contexts. Acosta-Gonzaga and Ramirez-Arellano, (2021) examined the relationships between motivation, emotions, cognition, and metacognition related to students' performance in a blended learning context. Their findings indicated a strong relationship between students' positive emotions, motivation, and use of metacognitive strategies, and concluded that students who were motivated intrinsically, extrinsically as well as by task value tended to “apply more sophisticated metacognitive strategies such as regulated learning and critical thinking” when learning online (p. 8). In addition, peer learning and help-seeking strategies also appeared to positively influence students' online learning achievement. However, the researchers also found that students experienced higher levels of “technology-related anger, test anxiety, and helplessness” when learning online, and that “bored, frustrated and anxious students tend[ed] not to use learning strategies (p. 9). In an earlier study, Bartels et al., (2017) investigated how two types of students—approach-motivated and avoidance-motivated--responded to negative feelings when learning. The researchers examined undergraduates' volitional strategy use, “i.e., self-efficacy, enhancement, negative-based incentives, and stress reducing-actions” (p. 606), and their relation to self-regulated strategy use. Results indicated that approach-motivated students were more self-efficacious and engaged in more stress-reducing actions as compared to avoidance-motivated students. These studies suggest that motivation can be a powerful moderator in students' use of metacognitive strategies and learning achievement, particularly in online contexts.

**Motivation strategies.** As previously mentioned, the domains of motivation and attitude are closely related. Just as Tinto (2017) identifies positive feelings of self-efficacy as essential to students' attitudes, Bartels et al., (2017) identify a similar relationship between self-efficacy and motivation.

Offering learning strategy support to enhance students' self-efficacy is likely essential to enhancing their attitude and motivation. Similarly, just as explicit goal setting likely enhances one's academic attitude, it likely has a similar effect on one's intrinsic motivation. Therefore, connecting learning experiences to students' goals may boost their persistence and motivation (Yeager et al., 2014). Finally, course design and support resources are particularly important in online learning, and instructors should take care to offer ample instructional and technological assistance, clearly written assignment instructions and grading rubrics, varied learning activities, and opportunities for peer interaction. These instructional strategies can defuse learner frustration and anxiety, which can undermine students' motivation (Acosta-Gonzaga & Ramirez-Arellano, 2021).

### ***Self-Regulation Component of Strategic Learning***

Self-regulation is how students manage and control the entire learning process (Weinstein et al., 2016). These strategies and skills include concentration, self-testing, time management, and using academic resources. As mentioned previously, the self-directed nature of asynchronous online learning places the responsibility to learn upon the student. Therefore, it is essential that online students can direct, manage, and accurately assess their learning. In addition, these skills may also help ameliorate the effects of students' decreased motivation when learning online (Karaoglan Yilmaz & Yilmaz, 2021). Finally, accounting requires professionals to work independently to seek solutions to complex problems (Chen et al., 2017; Schleifer & Dull, 2009), and the following strategies and skills may promote online accounting students' independent thinking and complex problem-solving.

**Concentration.** Concentration is one's ability to direct and maintain attention while completing academic tasks (Weinstein et al., 2016), and managing anxiety during tests (Collins et al., 1981). In an early study comparing different concentration strategies Collins et al., (1981) examined the effects of self-initiated relaxation techniques and cognitive self-coaching techniques as stand-alone and combined interventions. The self-initiated relaxation techniques—like mindfulness strategies—comprised a variety

of progressive relaxation exercises and breath counting to eliminate distracting thoughts during academic tasks. The cognitive self-coaching strategy—like positive self-talk—is comprised of teaching students to “talk themselves into constructive study and test-taking states and to maintain these states by monitoring and counteracting distractions” (p. 123). Results indicated that students who used a combination of self-initiated relaxation cognitive self-coaching scored significantly higher on comprehension and achievement tests as compared to students who used a single strategy. In a more recent study, comparing two attention distraction strategies, Ju and Lien (2016) examined the effects of a focused breathing strategy and a focused distraction strategy. The focused breathing strategy directed participants’ attention to their own breathing. The focused distraction strategy directed participants’ attention to a cued mental image. Results suggested that focused breathing was more effective in reducing distracting thoughts as compared focused distraction. Moreover, participants in the focused distraction strategy group appeared to experience an increase in their working memory load, while the focused breathing group appeared not to experience an increase.

**Concentration Strategies.** The studies referenced above align with literature pertaining to anxiety management and mindfulness (Bamber & Schneider, 2022; Hofmann & Gómez, 2017; Lever Taylor et al., 2014; Long et al., 2021)—specifically, breathing techniques that direct one’s attention to their breathing to suppress unwanted thoughts and distractions while completing academic tasks.

**Self-Testing.** Self-testing is one’s skills and use of comprehension monitoring through reviewing, paraphrasing, rehearsing, or formulating and answering questions to determine one’s level of understanding (Fiorella & Mayer, 2016a; Lynch, 2007; Weinstein et al., 2016). Self-testing also aligns with summarization and self-explanation (see *Selecting Main Ideas*).

Research studies suggest that self-testing is positively related to undergraduates’ academic achievement and long-term retention. Roediger and Karpicke (2006) conducted two experiments to study the testing effect, i.e., taking a memory test enhances later knowledge retention. Results

suggested that immediate testing after reading a passage leads to better long-term retention of information than merely restudying the same passage.

Self-testing at spaced intervals may also yield higher achievement on delayed tests (Dunlosky et al., 2013; Roediger & Karpicke, 2006). Hartwig and Dunlosky (2012) conducted a survey of undergraduate psychology students to estimate the relationship between learning strategy use and GPA, focusing specifically on self-testing and how students schedule study time. Results indicated a significant relationship between engaging in self-testing and higher academic achievement. However, using flash cards—a popular form of self-testing—was not associated with achievement. Nonetheless, the researchers concluded that low performers appeared to base their study on deadlines rather than continual planning (cramming), and those students who spaced their study appeared to use more study strategies.

Another self-testing strategy is interleaved practice, a method of study wherein students alternate their study with different problem types. Research evidence also supports interleaved practice as a highly effective self-testing strategy for undergraduate students (Dunlosky et al., 2013). Interleaved practice enhances learners' ability "to discriminate between types, identify the unifying characteristics within a type and improve [their] success in a later test or in real-world settings" (Brown et al., 2017, p. 207). Rohrer and Taylor (2007) conducted two experiments to examine light versus heavy massed practice and compare mixed versus blocked practice. The overall results indicated that test performance was significantly higher for students in the group that altered the timing or serial order of practice problems. In two other corresponding studies, researchers also determined that interleaved practice resulted in greater knowledge transfer for complex judgment tasks (Helsdingen et al., 2011b, 2011a).

The balance of research studies indicates that self-testing strategies result in higher learning outcomes. This is likely due to the high levels of cognitive processing required since "taking practice tests leads to more persistent learning outcomes than merely restudying the material, which does not

involve deep cognitive processing” (Fiorella & Mayer, 2016, p. 726). However, it is important to note the disagreement among some researchers regarding the effect of self-testing over complex subject matter. van Gog and Sweller (2015) contend that the testing effect decreases or disappears with increasingly complex learning tasks. Karpicke and Aue (2015) challenge Von Gog and Sweller’s conclusion and offer counterevidence to the contrary. Seeking to quell this dissension, Fiorella and Mayer (2016) identify a lack of ambiguity in determining what constitutes complex content and assessing learning transfer as the root cause for these disparate conclusions. Notwithstanding this debate, the balance of literature in this review indicates that self-testing is a highly effective learning strategy for undergraduate students, especially at spaced intervals with interleaved problems.

***Self-Testing Strategies.*** The studies referenced above align with the literature and offer five general strategies for teaching and coaching self-testing strategies to undergraduates. First, when self-testing, ensure the content and format of the self-test aligns with the final test (Fiorella & Mayer, 2016), and direct students to start with end-of-chapter textbook questions (Wallis, 2017). Second, encourage students to seek corrective feedback, and provide such feedback on practice tests (Fiorella & Mayer, 2016). Third, instructors should model self-explanation by actively explaining each solution step when working on problems (Chi et al., 1989; Renkl et al., 1997). Fourth, cue students to space self-testing at intervals (i.e., distributed practice) and to self-test repeatedly and frequently (Fiorella & Mayer, 2016). Finally, provide students with a variety of different problems types (interleaving) to review when self-testing (Brown et al., 2017; Dunlosky et al., 2013; Helsdingen et al., 2011b, 2011a) and encourage students to use different strategies when studying depending on context and complexity (e.g., summarizing, creating a concept map, self-explanations, or mnemonic techniques, e.g., loci or acronyms (Brown et al., 2017; Fiorella & Mayer, 2016a; Lynch, 2007).

**Time Management.** Time management is one's use of time management principles and practices for academic tasks (Weinstein et al., 2016). In a study investigating the relationship between students' academic time management, procrastination, and self-regulated learning Wolters et al., (2017) found that time management was an important predictor of procrastination. Moreover, the researchers assert that time management is essential to students' ability to self-regulate their learning—and it is critical to understand why and how much students procrastinate when completing academic tasks.

Procrastination is likely associated with a student's academic attitude and motivation. In an earlier investigation to identify underlying patterns of undergraduate academic procrastination Day et al., (2000) collected self-reported data through the Academic Procrastination Questionnaire. The instruments' subscales measured six emotional states: 1) test anxiety, 2) discouraged or depressed, 3) ambivalent, independent-minded, 4) socially-focused, optimistic, 5) oppositional, and 6) dependent. Results indicated that nearly 1/3 of respondents reported being severe procrastinators, with common patterns of feeling either socially-focused, optimistic or ambivalent, independent-minded.

With so many students procrastinating, researchers have also investigated its effects on academic achievement. In a study examining the effect of procrastination in an online course, (You, 2016) found that procrastination significantly impacted students' achievement and knowledge retention. You's (2016) results confirmed previous research that students who failed to study at regular intervals achieved lower grades than students who followed a routine study schedule. And students who appeared to "cram" at the end of the course displayed poorer long-term learning retention. These studies indicate that appropriate time management skills are essential to online students' self-regulation and academic achievement.

**Time Management Strategies.** Since time management is a complex construct with several mitigating factors (Day et al., 2000; Wolters et al., 2017). Harrington (2021) suggests that students should use various learning strategies to develop effective time management skills. To that end,

Harrington (2021) developed a guide for an online finance course (Appendix D) that cues students to use the following strategies: academic goal-setting and planning (Schraw, 1998), aligning academic tasks to longer-term goals (Bartels et al., 2017; Schraw, 1998; Tinto, 2017; Yeager et al., 2014), self-coaching (Collins et al., 1981), self-testing (Brown et al., 2017; Dunlosky et al., 2013; Fiorella & Mayer, 2016a; Helsdingen et al., 2011b, 2011a; Roediger & Karpicke, 2006), self-explaining (Chi, 2009; Dunlosky et al., 2013; Renkl et al., 1997; Wylie & Chi, 2014), selecting main ideas (Bretzing & Kulhavy, 1979, 1979; Brown et al., 2017; Dunlosky et al., 2013; Fiorella & Mayer, 2016a; Garner, 1982), and reflecting on completed learning (Karaođlan Yilmaz et al., 2018; Schraw, 1998).

**Using Academic Resources.** Using academic resources (now known as study aids) is students' "willingness to use different academic resources such as writing centers, tutoring centers, and learning or academic support centers, when they encounter problems with their coursework or performance" (Weinstein et al., 2016).

Research indicates that learner characteristics influence their inclination to seek help (Alevan et al., 2003). Students with little or no prior domain knowledge do not seek help as effectively as students with more prior knowledge (Alevan et al., 2003). In addition, motivational factors also influence help-seeking—students who are performance-oriented (extrinsically motivated) instead of learning-oriented (intrinsically motivated) seek help as a means to an end—that is a quick solution to a problem (Alevan et al., 2003).

Appropriate help-seeking is also associated with students' metacognitive skill levels. Investigating students' metacognitive monitoring and help-seeking behavior (Chu et al., 2018) found that in general, students were less likely to seek help "if they were overconfident, especially for unfamiliar material" (p. 1482). This overconfidence could stem from students' mis-calibrating their level of understanding (Chu et al., 2018; Zabucky & Bays, 2011) which could be a critical metacognitive disconnect. Some researchers argue that "students' ability to evaluate their own understanding may be



the most fundamental metacognitive skill” (Zabrucky & Bays, 2011, p. 123), and if students are unable to accurately calibrate their understanding, they may not seek help. In such cases, Zabrucky and Bays (2011), suggest providing students with opportunities to make predictions about an exam score right before the exam, and a second score prediction after completing the exam. Once the exams are graded, students can compare their actual scores with their predicted scores, allowing instructors to cue students in reflecting on why their actual scores diverge from their predictions. This exercise allows students to develop their calibration skills, which may encourage them to seek the help they need.

***Using Academic Resources Strategies.*** A student’s willingness to use academic resources likely hinges on certain learning characteristics, such as prior knowledge, motivation, and calibration (Aleven et al., 2003; Chu et al., 2018; Zabrucky & Bays, 2011). For students with lower prior domain knowledge, it is likely that “they don’t know what they don’t know”. In these cases, online accounting instructors can consider creating a repository of enriched and extended learning activities in a course and direct students to use them as a form of self-help. As stated previously, connecting students’ long-term goals with course goals can enhance their intrinsic motivation (Bartels et al., 2017; Schraw, 1998; Tinto, 2017; Yeager et al., 2014), which may induce them to engage in appropriate help-seeking behavior. Finally, enhancing students’ knowledge calibration through prediction and postdiction opportunities may also encourage them to seek appropriate help (Zabrucky & Bays, 2011).

### **Summary of Literature and Connection to the Problem of Practice**

Successful online learners use metacognition to control their cognition processes within the domains of skill, will, and self-regulation. Metacognition also comprises the knowledge of, how, and when (i.e., before, during, and after learning) to use specific learning strategies and skills to generate new knowledge. Moreover, metacognition is likely critical for student success in online asynchronous learning and accounting education. However, research suggests that online accounting students may experience metacognitive barriers that impede their online learning. Therefore, online accounting

instructors need to integrate and cue relevant metacognitive learning strategies to develop students' metacognitive habits of mind.

Sound instructional design principles are also essential to developing and supporting students' metacognition in asynchronous online environments. To reduce transactional distance, instructors must attend to four fundamental interactions, learner-to-content, learner-to-technology interface, instructor-to-student, and peer-to-peer. Instructor-to-student and peer-to-peer dialogue and interaction are essential to enhancing students' metacognition and learning outcomes.

At a public commerce school, historical COMM 2010 and COMM 2020 grade distributions and aggregate LASSI data suggest that many students struggle to deploy metacognitive learning strategies in these asynchronous accounting courses. The literature reveals challenges in online asynchronous learning, how students can effectively deploy learning and study strategies when learning online, and specific ways instructors can provide metacognitive support to online accounting students.

## Chapter 3: Methods

### Study Design

A single case study is defined as “an approach that intensely studies a case as a distinct whole, rather than collecting data across a variety of cases using mostly qualitative tools to rich data for a deep understanding of the [problem]” (Mertens & Wilson, 2019, p. 543). Since COMM 2010 and COMM 2020 are corresponding and sequential courses, taught by a single instructor, virtually identical in design and delivery, and enroll overlapping student populations,<sup>4</sup> I approached both courses as a single case. In addition, this case study was intrinsic in nature since the research and subsequent findings are bound to these courses (Hamilton & Corbett-Whittier, 2013; Mertens & Wilson, 2019) in order to best meet the needs of this commerce school. This case study investigated the following research questions:

RQ1) How does the course design support students' deployment of learning and study strategies related to self-testing, testing, and anxiety within these asynchronous online accounting courses?

RQ2) To what extent and in what ways do students deploy learning and study strategies related to self-testing, testing, and anxiety in these asynchronous online accounting courses?

RQ3) What challenges do first- and second-year students experience in their deployment of learning and study strategies related to self-testing, testing, and anxiety within these asynchronous online accounting courses?

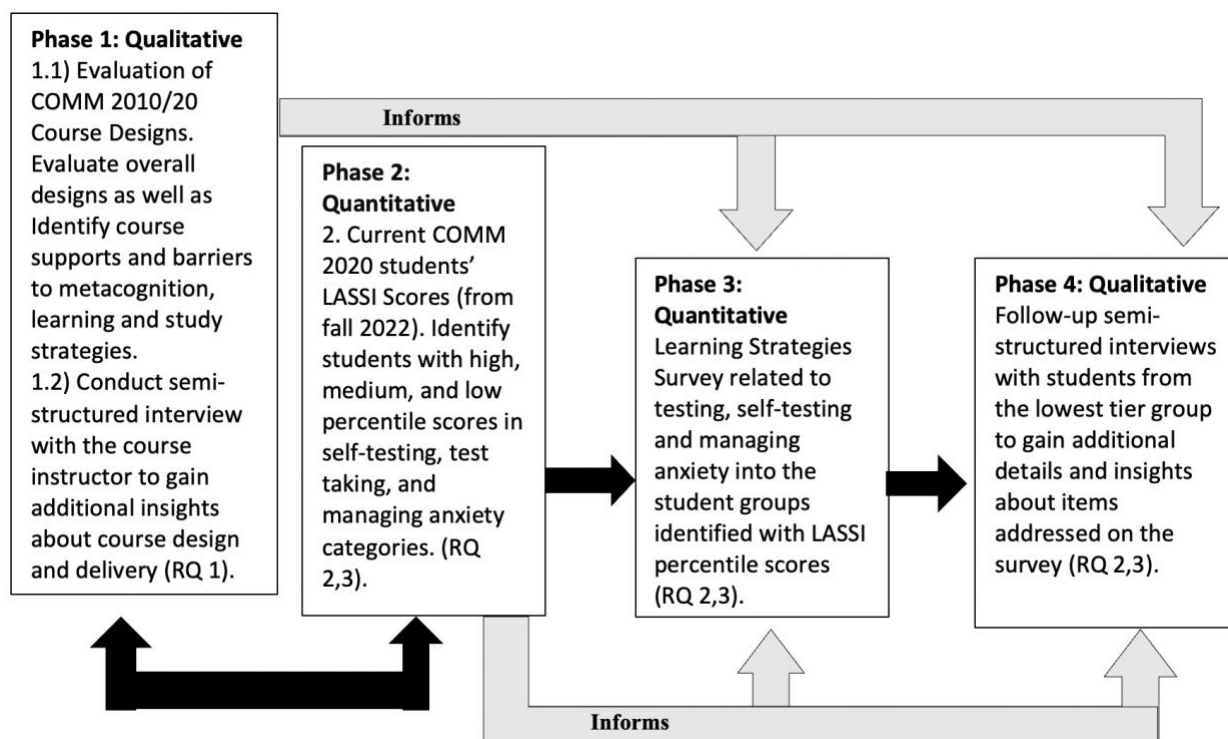
This single case study design is depicted in Figure 3.1 and a table comprising data collection, data analyses, and quality considerations can be found in Appendix E.

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<sup>4</sup> Most COMM 2010 students enroll in COMM 2020 in the following semester. Both courses are offered in the fall, spring, and summer semesters each academic year. Survey and interview participants completed COMM 2010 in the previous fall semester and were in the spring COMM 2020 course at the time of this study.

Figure 3.1

## COMM 2010 and COMM 2020 Case Study Design Plan



**Note:** Phase 1 was completed prior to Phase 2. Data from Phase 1 informed Phases 3 and 4, and data from Phase 2 also informed Phases 3 and 4.

### Case Study: Phase One

The first phase was an in-depth review of COMM 2010 and COMM 2020. This phase addressed RQ1: How does the course design support students' deployment of learning and study strategies related to self-testing, testing, and anxiety? I conducted this phase in two steps: a) an evaluation of the course design and b) an interview with the course instructor.

### Data Collection

In step 1.1, I evaluated the Fall 2022 and Spring 2023 COMM 2010 and COMM 2020 course designs with the Quality Matters Higher Education Rubric (See Appendix F) (Quality Matters, 2020). This rubric is intended to assess the "quality and assisting the course design of online and blended courses in higher education" (*QM Rubrics & Standards*, n.d.). Since effective practices in online instructional design

likely facilitate students' metacognition deployment (Kim et al., 2018; Peck et al., 2018), it was an appropriate way to begin this study. After evaluating the courses with the above-referenced rubric, I re-evaluated the courses to identify specific supports for students' deployment of self-testing, testing, and anxiety management strategies. I recorded my observations in the Learning Strategies Support table (Appendix G).

In step 1.2, I conducted one semi-structured interview with the course instructor<sup>5</sup> to gain additional insights about the course design, delivery, and student support pertaining to self-testing, testing, and anxiety management. We met via Zoom, and I recorded the interview, following the semi-structured interview protocol (Appendix H).

### ***Data Analysis***

Data collection and evaluation occurred almost simultaneously during the course review. I evaluated and scored each course with the Quality Matters rubric (Appendix F). Next, I extrapolated overall conclusions from the completed Learning Strategies Support table (Appendix G). It is important to note that the nature of these steps did not require coding or analyses per se, but my overall observations and conclusions did inform data collection throughout the remaining phases of the study, i.e., constructing new items or revising existing items in student learning strategy survey and the semi-structured student interview protocol.

I transcribed the transcript from the recorded instructor interview, and used Microsoft Excel to code, organize, and categorize data. To maintain coding credibility, I maintained a codebook that included each code and its definition. To verify my reasoning for each code and its corresponding definition, I asked a critical peer to review my codebook (see Appendix I). Analysis of the course review and instructor interview enabled me to generate findings and sub-findings reported in chapter 4.

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<sup>5</sup> The same instructor teaches COMM 2010 and COMM 2020.

### **Case Study: Phases Two and Three**

The second and third phases comprised a review of participants' fall 2022 LASSI scores, as well as the administration of the COMM 2010/20 Learning Strategies Survey. This phase addressed RQ2: To what extent and in what ways do students deploy learning and study strategies related to self-testing, testing, and anxiety in these asynchronous online accounting courses? And RQ3: What challenges do first- and second-year students experience in their deployment of learning and study strategies related to self-testing, testing, and anxiety within these asynchronous, online accounting courses?

#### ***Participants and Sampling***

The participant pool consisted of 416 COMM 2020 students enrolled in the Spring 2023 course. These students completed the LASSI in the fall of 2022 while enrolled in the COMM 2010 course. I began the recruitment process by sending a study description and an e-signature consent form for their review and signature (See Appendix J). One week later, I sent a reminder to all students who had signed the consent form to consider participating in the study. In total, 135 students consented to the research study, and 105 completed the Learning Strategies survey, which yielded a 25.2% response rate. Of these respondents, 70 identify as female, 34 as male, and one respondent preferred not to report their gender. Most respondents (103) were currently in their second year of college, and two were in their first year. The respondent pool was primarily white (73.3%), followed by Asian (17.1%), Hispanic (3.8%), Black or African American (2.9%), and multiple ethnicities (1.9%).

Once I received a signed consent form from each participant, I saved it in a secure file and sent each participant a survey link via email. Next, I added the participant's information to an Excel spreadsheet which included each participant's email, first and last names, the date their survey link was sent, their LASSI scores within the *Anxiety*, *Self-Testing*, and *Testing* scales, their willingness to participate in a follow-up interview, and their demographic information.

### ***Data Collection***

All study participants completed the COMM 2010/20 Learning Strategies Survey through Qualtrics (See Appendix K). The purpose of the survey was to understand the extent and in what ways students who scored at various LASSI percentile levels deployed strategies related to anxiety management, self-testing, and testing strategies while enrolled in the COMM 2010 course. In addition, survey results informed revisions to the student semi-structured interview protocol (phase four).

The survey comprised Likert-type, multi-select, and open-ended questions that addressed course elements and specific strategies identified in the literature (Bretzing & Kulhavy, 1979; Brown et al., 2017; Chi et al., 1989; Fiorella & Mayer, 2016b; Garner, 1982; Naveh-Benjamin, 1991; Naveh-Benjamin et al., 1987; Renkl et al., 1997; Rozakis, 2003), as well as participants' demographical information. Before distributing the survey, I conducted a pilot test with three reviewers and revised and refined survey items based on their feedback.

### ***Data Analysis***

After collecting COMM 2010/20 Learning Strategies survey responses, I assigned numeric values to the Likert-style categories, which enabled me to classify, organize, and summarize the data using descriptive statistics (Ravid, 2020). I reviewed individual responses for the four open-response items and categorized answers by themes. My advisor reviewed and confirmed the answer categories for each response group. The analysis results enabled me to generate findings and sub-findings reported in chapter 4.

### ***Case Study: Phase Four***

The fourth and final phase of this study was student interviews. The purpose of these interviews was to uncover additional insights from the COMM 2010/20 Learning Strategies Survey findings. This phase addressed RQ2: To what extent and in what ways do students deploy learning and study strategies related to self-testing, testing, and anxiety in these asynchronous online accounting

courses? And RQ3: What challenges do first- and second-year students experience in their deployment of learning and study strategies related to self-testing, testing, and anxiety within these asynchronous, online accounting courses?

### ***Participants and Sampling***

Since the aim of this case study was to understand students' experiences regarding anxiety, self-testing, and test-taking in online accounting courses at the commerce school, I purposively recruited students with the lowest LASSI percentile scores. I reasoned that students with the lowest LASSI scores would likely represent those who needed the most help and would provide helpful insights during the interviews. In addition, there were approximately 800 undergraduates at this public commerce school. At the start of the fall 2023 semester, there were 400 incoming 3rd-year students. Of these, 211 students (53%) identify as female, 88 students (22%) are historically underrepresented students, and 68 (17%) are first-generation college students). To understand the wide-ranging experiences of COMM 2010/20 students, I sought to recruit interview participants who represented these demographics, i.e., female students, students from historically underrepresented populations, and first-generation students.

With these criteria in mind, I identified 15 interview candidates from the 35 participants who indicated a willingness to participate in follow-up interviews. I purposively chose students who scored below the 50<sup>th</sup> percentile in at least two LASSI categories of *Anxiety (ANX)*, *Self-Testing (SFT)*, and *Testing (TST)*. In addition, I identified students who scored below the 50<sup>th</sup> percentile in these LASSI categories and who were also from historically underrepresented populations or first-generation college students. Of these 15, six students agreed to be interviewed (see Table 3.1). The interview recruitment email and informed consent agreement are found in Appendix L.



**Table 3.1***COMM 2020 Interview Participants*

<b>Pseudonym</b>	<b>Year</b>	<b>Gender</b>	<b>Ethnicity</b>	<b>First generation</b>	<b>ANX</b>	<b>SFT</b>	<b>TST</b>
Bryony	2	Female	white	no	25	40	15
Daisy	2	Female	Asian	no	15	10	55
Heather	2	Female	multiple	no	5	1	25
Iris	2	Female	white	no	5	10	70
Rose	2	Female	Asian	yes	20	40	55
Violet	2	Female	Hispanic	yes	25	15	55

**Data Collection**

I conducted semi-structured interviews with participants to gain additional insights about their COMM 2010 and COMM 2020 course experiences. I used Zoom to record the interviews, following the semi-structured interview protocol (Appendix M).

**Data Analysis**

I systematically collected, organized, and interpreted data throughout this phase of the study. First, I used an AI-based transcription service to generate the first draft of each interview transcript. Next, I listened to the interview audio while reading through the draft to correct any misinterpreted text. I then placed each transcript segment into a separate cell within a single Excel spreadsheet. Next, I created a codebook to guide my coding process. I initially coded each interview transcript with both *a priori* and emergent codes, and by the end of the process, I had identified 35 individual codes. To verify my reasoning for each code and its corresponding definition, I asked a critical peer to review my codebook (Appendix N). After completing an initial coding round, I reviewed each transcript again to confirm or update each code. Once the coding process was complete, I filtered each spreadsheet by each code to identify patterns and relationships within the data. This filtering process enabled me to sort and organize data into eight categories. It was from these categories that I generated the findings and sub-findings reported in chapter 4.

## **Ethical Considerations**

Since this research involved human subjects, I adhered to strict ethical practices throughout the study, including an informed consent process outlined in the IRB-SBS guidelines. By fully informing participants about the study, each participant had the opportunity to understand their risks and benefits before deciding to enroll. Moreover, by engaging participants through a well-defined recruitment and consent process, I experienced a smooth and robust data collection process (Human Research Protection Program, n.d.). I also asked each participant for their permission to include them in my research and I kept accurate consent form records. In addition, I ensured that all participants were over 18 (Appendix J).

I also attended to data privacy throughout the study. I kept all participant data in a password-protected UVA box file. When coding data, I assigned a number to each participant and kept a separate password-protected file with participants' names and I.D. numbers. In Chapter 4 (Findings) I removed all non-relevant identifying information and used pseudonyms to protect participants' anonymity. The data management plan is Appendix O.

## ***Researcher Positionality***

As a doctoral researcher and instructional designer for this school, I sought to maintain an awareness of my inherent biases as I conducted this research. My past experiences as a classroom teacher and my current position leads me first to seek instructional solutions. However, by acknowledging these biases, I actively sought to remain open to the data as they emerged which enabled me to generate findings from expected and unexpected emergent themes.

## **Assumptions, Delimitations, and Limitations**

### ***Delimitations***

This study was limited to three specific learning and study strategies assessed by the LASSI: *Self-Testing*, *Testing*, and *Anxiety*. These categories have been previously identified wherein COMM 2010/20

students' LASSI percentile scores are low (self-testing) or are likely strongly associated with course grades (test taking and anxiety). This study did not address the remaining seven LASSI learning and study skill categories or COMM 2010/COMM 2020 students' experience with them. Finally, I collected survey and interview data only from students enrolled in the spring 2023 COMM 2020 course.

### ***Limitations***

There are significant limitations to this study. First, all participant data was collected with self-reporting instruments. Many studies have identified drawbacks to self-reporting instruments, such as social desirability bias, question misinterpretation, and response-shift bias (Howard, 1980; Rosenman et al., 2011). Second, since this is a case study, the experiences of these participants will not necessarily reflect the experiences of past or future students. Third, the quantitative data collection instruments (i.e., LASSI and the course experience survey) limit respondents to a range of categories, which I partially addressed through follow-up interviews with students from the lowest percentile groups. However, due to limited recruitment and time constraints, I was only able to conduct interviews with six female participants, which likely limited additional insights. Finally, since my timeframe for completion was relatively short, I had limited time for data collection, categorization, and analysis. Lastly, the university experienced a horrific campus tragedy that negatively impacted the entire community. Students, faculty, and staff experienced grief and anxiety in the event's aftermath, and many people are still coping with such feelings at the time of this writing. It is likely that this tragedy triggered or exacerbated feelings of anxiety for the study participants, which may have influenced findings.

## Chapter 4: Findings

To explore how the COMM 2010 and COMM 2020 courses supported students' deployment of self-testing, testing anxiety strategies, how students deployed strategies, and any challenges they may have experienced, I gathered qualitative data from a course review, an instructor interview, and six student interviews. I also collected quantitative and qualitative data from student surveys. These data sources enabled me to identify and present the following findings that addressed the research questions:

- Finding 1: COMM 2010 and COMM 2020 are well-designed, asynchronous online courses that appear to provide ample resources and support for students to learn the content.
  - Sub-finding 1.1: These courses may be students' first experience with high-stakes online asynchronous learning.
  - Sub-finding 1.2: Students may have entered the course with established learning strategies but revised these methods to enhance their learning.
  - Sub-finding 1.3: These courses provide students with multiple support points related to self-testing, testing, and anxiety.
- Finding 2: Many students reported deploying self-testing and testing strategies in COMM 2010.
- Finding 3: Many students reported experiencing anxiety while in COMM 2010.
  - Sub-finding 3.1: For those students who reported experiencing anxiety, there were likely various anxiety triggers associated with the course.
  - Sub-finding 3.2: For those students who experienced anxiety, they likely sought help from various sources outside of the course.
- Finding 4: The structure and dialog may increase the transactional distance in these courses.
  - Sub-finding 4.1: Smaller student groups appeared to decrease the transactional distance in these courses.

- Sub-finding 4.2: The relatively small amount of instructor-generated content may increase the transactional distance in these courses.

Some additional student insights not directly related to the above findings are listed in Appendix W.

**Finding 1: COMM 2010 and COMM 2020 are well-designed, asynchronous online courses that appear to provide ample resources and support for students to learn the content.**

After reviewing both courses using the QM Higher Education Rubric 6<sup>th</sup> edition (Appendix F, Table 1) and I determined that COMM 2010 and COMM 2020 are well-designed online, asynchronous courses. This rubric addressed 42 specific standards within the following eight categories: course overview and introduction, learning objectives, assessment and measurement, instructional materials, learning activities and learner interactions, course technology, learner support, and accessibility and usability. I gave these courses top scores for 31 of the 42 standards. The 11 standards that fell short were spread across several categories. Five of these standards are in the accessibility and usability section (see Table 4.1). Since these courses will be transitioning from Blackboard to Canvas (LMS) in the summer 2023 semester, these five standards can be re-evaluated at that time.

Of the remaining six standards that might require attention, four of these (standards 1.6, 1.7, 6.4, and 7.1) simply pertain to missing specific information or instructions within the course materials, such as required digital and literacy skills, data privacy statements, and links to general technical help.

The deficiencies pertaining to the two remaining standards are more complex. Standard 3.4 reads: *The assessments are sequenced, varied, and suited to the level of the course.* While the assessments within these courses are sequenced and suited appropriately, they are not varied. All course assessments (3 midterms and one final exam) are similar in structure and are delivered through the McGraw Hill Connect system. Most test items are objective (e.g., multiple choice, true/false), with a few free response (numeric) items, and comprise approximately 20 questions each.

Standard 5.2 reads: *Learning activities provide opportunities for interaction that support active learning.* As mentioned previously, these asynchronous courses serve many students (500-700+) in the fall and spring semesters (100 +/- in the summer semester), which presents a significant logistical challenge in connecting students together. The instructor has provided optional opportunities for students to build their own study groups through the Microsoft Teams platform (MS Teams). Each week, a new MS Teams channel is available for students to view and ask and answer questions about the current week's content. Students, TAs, and the course instructor frequently interact throughout the week on these channels, and the average response time from a TA to a student question is less than 24 hours. In the spring 2023 courses, the instructor plans to provide more MS Teams guidance to students, enabling them to leverage the platform better and increase peer interactivity. In addition, the instructor and TAs offer several hours of in-person and Zoom office hours each week. However, it is important to note that a student can complete all course requirements without directly interacting with a peer, a TA, or an instructor.

**Table 4.1**

*COMM 2010/2020 Lower-score QM Standards*

<b>General Standards</b>	<b>Specific Review Standards</b>	<b>Points</b>	<b>Score</b>	<b>Notes</b>	
<b>Course Overview and Introduction</b>	1.6	Computer skills and digital information literacy skills expected of the learner are clearly stated.	1	.5	Learning environment statement outlining the online asynchronous modality, and Blackboard LMS, but digital information and expected literacy skills are not included.
	1.7	Expectations for prerequisite knowledge in the discipline and/or any required competencies are clearly stated.	1	.5	Entry-level course—only basic computer skills required. Technology requirements addressed in the syllabus *COMM 2010 is a pre-requisite for COMM 2020, but that is not specifically stated in the syllabus.
<b>Assessment and Measurement</b>	3.4	The assessments are sequenced, varied, and suited to the level of the course.	2	1	3 midterm exams; 1 final exam—all similar formats and delivered through the McGraw Hill Connect system.

General Standards	Specific Review Standards	Points	Score	Notes
<b>Learning Activities and Learner Interaction</b>	5.2 Learning activities provide opportunities for interaction that support active learning.	3	2	The asynchronous nature of the course does not lend to peer-to-peer or instructor-to-peer interaction. However, students do have the option to interact with one another through Microsoft Teams channels that are available throughout the course.
<b>Course Technology</b>	6.4 The course provides learners with information on protecting their data and privacy.	1	0	Not found.
<b>Learner Support</b>	7.1 The course instructions articulate or link to a clear description of technical support offered and how to obtain it.	3	2	In Getting Help: links to Blackboard and Connect support. Above referenced links also included in course syllabus. No link to general technical help.
<b>Accessibility and Usability</b>	8.1 Course navigation facilitates ease of use.	3	2	The course navigation is intuitive within the Blackboard LMS. There are general concerns with the ease of use within Blackboard.
	8.2 The course design facilitates readability.	3	1.5	Screen readers are available (see below) but not specifically mentioned in the course.
	8.3 The course provides accessible text images and files, documents, LMS pages, and web pages to meet the needs of diverse learners.	3	2	In student Help Center, the Accessibility tab connects to information regarding Blackboard structure overview, HTML5 DIVs and iFrames for visually impaired learners, ARIA (Accessible Rich Internet Applications Suite), Keyboard navigation, screen readers, quick links (keyboard shortcuts), and Blackboard Alexa Skill. No direct link or instructions to access these options are included in the course.
	8.5 Course multimedia facilitate ease of use.	2	1	Multimedia accessed through mouse clicks. Optional keyboard navigation is available but not highlighted in the course.
	8.6 Vendor accessibility statements are provided for all technologies required in the course.	2	0	Not found.

The student interviews provided more insight into the quality and value of these courses. Heather and Violet mentioned that they appreciated the flexibility of the online, asynchronous modality. Heather shared that her campus job requires her to work odd hours, and the course structure allows her to determine her own study schedule. In addition, Bryony, Daisy, Heather, Iris, and Rose indicated that the courses provided them with varied and ample resources and support to learn the content. They each described how the various course resources helped them devise their own personal weekly learning strategies. In her interview, Daisy described how she explored different resources as she developed her learning strategy:

I think going in, I saw everything that we had to do every week. And I was like, 'Oh, my goodness, this is this is a lot like, we would have, like textbook readings, Smartbook problems, these concept overview videos, practice problems, homework problems, like every week!' But I think like for an asynchronous class, like definitely gave us a lot of resources... And I think it was nice that we could like, explore the different resources and like the incentive to get credit for. And then you kind of saw what worked for you.

Heather also identified the practice tests essential to her learning and added that if this had been a synchronous in-person course, her study methods would have likely been the same.

Yeah, I think there were definitely enough resources. And [the professor] was, like, very forthcoming with things. She was very transparent with what we would need and like the practice tests were definitely very similar to what actual exams were like. And they're just like, so many resources out there. I don't think like it being in person would have changed anything for me at all.



***Sub-finding 1.1: These courses may be students' first experience with high-stakes online asynchronous learning.***

All student interview participants indicated that this was their first experience participating in such a large, asynchronous course wherein the stakes were so high, which initially caused them to feel some uncertainty about how they would manage their learning in a subject in which they lacked any type of experience. Daisy explained how at first, she didn't know how she was going to manage her learning:

And I'd never taken like, obviously, we all kind of went through COVID and homeschooling in a way online schooling. But I had never taken a course that was meant to be all online. And so initially, I didn't really know how to approach it.

For Heather, the cognitive dissonance she experienced was not necessarily in the learning modality, but in learning a subject in which she had no previous experience:

Accounting was just like a totally different experience, even though it was like the same concept of being online, just because it's essentially like learning a new language, maybe like a tech language. So that was a little different. So like, is it my first time taking an online class like that? Like, no, but it was? I just did it totally differently. If that makes sense.

A lack of experience managing learning a new and complex subject may have resulted in time management challenges for some students. The student interviewees shared that learning basic accounting in this asynchronous online course took more time than they had anticipated. Four interviewees expressed their frustration about the amount of time they had to dedicate to this course—while also acknowledging that without in-person meetings, it was up to them to manage their time each week to complete course requirements. Moreover, without set class meetings, they found it easier to procrastinate—and at times, found themselves scrambling to submit assignments on time or falling behind. Rose described her challenges with time management:

But I think like, with how much content we had to learn, it was kind of needed in a way to like master the material. I do think it's a really big-time commitment. This semester, less, I think, just because of the way things have been restructured a little bit, but last semester, I remember spending a good 10 hours a week, 15 hours a week on the class, at least minimum and then studying for the exams just had to do so much practice would, we'd all kind of dedicate a couple of days just to the one class, which could be hard in terms of time management for other classes.

Bryony also reported struggling with time management in COMM 2010, which she is still experiencing in COMM 2020:

I wasn't as proactive as I could have been. I mean, I'm still not but I I got in a bad habit of since the course is online, it feels different than other courses. So I would just kind of get into going through the motions, just surviving until the next like, due date, getting everything in. And then the week before the test rolls around, I started start to panic a little bit that I don't actually know the material. That's that's pretty much how it goes. I'm experiencing right now.

***Sub-finding 1.2: Students may have entered the course with established learning strategies but revised these methods to enhance their learning.***

Student interview participants described how before entering this course, they applied different study strategies when learning different content. They also described how they changed their previous study methods to meet the demands of COMM 2010.

Five participants (Daisy, Rose, Bryony, Iris, and Violet) indicated that prior to taking this course, they approached learning differently depending on the subject. Violet explained how she managed her learning in different subjects:

Yes, I think I did have a system, it really depends on the subject. So for more application-based subjects, it's kind of like going over the rules that tend to work for most problems, and working

on applying those in different situations. So for like, classes, like, macro and microeconomics, and then for more for classes, where it's more just like knowledge-based, like I took a psychology class that was more like, memorization of terms, and how, like how things function in different ways. So yeah, so they I think, depending on the subject, I would have like a different system that works better for each.

However, these same five participants reported that at the start of the course, they often felt overwhelmed with the course content and workload. This dissonance prompted them to rethink and revise their learning methods as the semester progressed, which took some time. Iris stated, "Yeah, so now I'm taking COMM 2020 after 2010 I definitely for a long time in 2010, like it took me a while to kind of adapt and like learn how to adapt my studying method." Rose also shared how she changed her learning strategy in COMM 2010:

And I you would hear from prior students that it was like a notorious class, I was kind of worried. So it was really trial and error. Like for the first exam, I tried, like, oh, like taking your notes, you know, like a week or two before the exam, and then like reading through them, and that wasn't super successful. So like, second exam, I was like, okay, like, let's focus more on practice problems, something like that. So I would consistently tweak my study methods based on like, what was working and what wasn't. So like, ultimately, it was a very, like, read and answer questions, read and answer questions, read and answer questions that worked out best for me. So I definitely the process that I came with came in with wasn't the process that I ended up finishing.

After experiencing initial struggles, participants reported gradually developing their own successful learning approaches by dedicating more or less time to certain course elements, i.e., Smartbook readings, activities, and videos, practice and homework problems, and instructor videos (introduction, problem walk-through, and prior week review sessions). All six participants identified the

practice and homework problems as essential to developing basic accounting knowledge. Violet explained how working practice problems helped her understand the content:

Now that I've spent more time with this subject, I would say that I spend more time like doing problems like, like several times to better understand how it works or doing different types of problems, or looking at problems that I've gotten wrong before and like trying to understand where I went wrong.

Daisy, Rose, Iris, and Violet shared how their experiences in COMM 2010 prepared them for implementing changes to their learning strategies in the COMM 2020 course. They reported feeling more confident in their learning strategy and better able to manage their time. Violet shared how COMM 2010 prepared her for COMM 2020.

Yeah, I feel like I implemented a lot of changes in during COMM 2010 Like more towards the end, like for the final like I was putting in practice lots of different, like methods. And I feel like since the end of COMM 2010. I've been using those same methods and I feel like it's working much better than when I first started the course.

***Sub-finding 1.3: These courses provide students with multiple support points related to self-testing, testing, and anxiety.***

After reviewing the courses with the QM Higher Education Rubric, I re-analyzed these courses using the Learning Strategies Support Table (Appendix G), wherein I found multiple instances of support related to self-testing, testing, and anxiety.

**Self-Testing.** Throughout the course, the instructor emphasizes interleaving problems, distributed practice, summarizing key content, and models self-explanation as essential learning and study methods. Throughout the course announcements, students are cued to use practice problems and to follow a study schedule approximately one week before each exam. In addition, the course orientation module provides students with several cues about interleaving, distributed practice, and

summarizing key content by means of the *Study Tips and Essentials* (see Appendix P) handout as well as *Tips from Prior Students* (see Appendix Q)—both of which are available for students to download. In addition, within each week’s instructional content, there is a folder titled “Sample Problems and Applications” containing video content with a previous instructor modeling self-explanation as he works through each step of the problem.

The *Orientation: 12 Steps to Getting Started* module also provides students with a link to an overview video that highlights e-book tools that emphasize self-testing, interleaving, and distributed practice: *Recharge*, *Reports*, and *Practice quizzes*. The *Recharge* tool provides students with quizzes over previously learned content. Students select chapters they wish to review, and the program presents questions about the concepts they found more difficult or would be likely to forget. The *Reports* offer a review topic scores, missed questions, and the most challenging learning objectives—which display an individual’s most challenging content and provide additional concept mastery opportunities through practice quizzes. In addition, the self-assessment option in *Reports* presents students with their self-reported concept mastery confidence levels within three data points: 1) concepts they were aware they knew the answer (higher-level calibration), 2) concepts they were unaware they knew the answer (lower-level calibration), and 3) concepts they were unaware they didn’t know the answer (lower-level calibration). Finally, *Practice quizzes* allow students to choose specific content to review and select the number of questions in a custom-targeted practice quiz.

Additionally, the *How To Learn* module includes a 5-minute video and written summary highlighting interleaving and distributed practice. The spring 2023 course iteration includes a UVA library link to the e-book *Teach yourself how to learn: Strategies you can use to ace any course at any level*, by S.Y. McGuire (2018), which includes tips about distributed practice and practice testing.

**Testing.** Each course test bank has been carefully crafted and curated, with consistent historical accuracies calculated and maintained. The instructor provides students with ample review materials for

each exam, and coaches students to use self-testing, distributed practice, and interleaving when preparing for tests. Moreover, when individual students meet with her, the instructor re-iterates these practices:

As I meet individually with students, I felt like some could really benefit from just some structure. So I shared this [post-exam analysis] with them and said, 'You need to customize this obviously with your own timeline and then with what you identify as the units that you need more practice with.' I highlighted to them, 'After you watch this video, you're going to see that you want to mix up your studying. So notice how for Monday, I said do your SmartBook for unit one, but then do the unit four demo cases.' So I was explaining how you get those stronger connections in your brain when you don't just go in a chronological order with content. When you're mixing up what you're studying.

Prior to each test, all students have access to a detailed review sheet that provides step-by-step guidance about what the exam will cover, as well as engage with the exam question forum MS Teams site moderated by the course TAs. In addition, the instructor also offers an optional post-exam analysis (see Appendix R) to help students analyze their test performance to identify the learning and study strategies that work best for them. The analysis asks students to report the percentage of time they dedicated to exam preparation in nine different tasks, including skimming textbook chapters, reading the textbook, reviewing notes, reviewing example problem videos, reviewing chapter questions, posting questions to the MS Teams site or working with a study group, meeting with TAs, completing case studies, and working on practice problems. If students request a meeting to discuss their exam results, the instructor requires the student to complete the post-exam analysis prior to the meeting.

**Anxiety.** In the fall 2022 course, there are a few announcements addressing anxiety and mental health. These messages included a video and written message, as well as a link and phone number to the counseling and psychological services offered by the university. After a campus tragedy, the

instructor also provided their personal phone number to all students and encouraged them to call or send a text message. The spring 2023 course iteration includes additional resources, including the above-referenced UVA library e-book, which includes tips for controlling test anxiety through deep breathing exercises and positive self-talk, as well as a link to a mindfulness website specifically designed for college students.

The instructor makes herself available at several points during the week to meet with individual students. In these meetings, some students reported test anxiety as well as disappointment with their exam scores. During her interview, she described how she worked with students to identify the root causes of their anxiety and disappointing test scores. As one example, the instructor shared about a meeting with a student experiencing anxiety and how she provided a practical way to address it:

So what I'm trying to help them do here is figure out a pattern...What I went through one of these with one student, I think some of his might have been some anxiety, not panic attack anxiety, but there was some anxiety there. We realized this pattern...there were questions that had some sort of formula that you would apply, he was getting it to a point and then he wasn't finishing the formula, and it happened on three questions. What I try to do then is once we identify that pattern, I say, "Okay, well how are we going to fix this? So, for you, you need to write this formula down on your paper and have a checklist that says, did I complete the formula?" Because this happened three times.

In their interviews, Daisy, Heather, Iris, and Violet expressed their appreciation for how the course instructor made herself available, and how her kind and welcoming demeanor made them feel supported. Iris shared that her positive experience with the instructor in COMM 2010 helped her decide to enroll in COMM 2020:

[The professor] I has been, like, amazing to get in contact with. So I definitely think that, like, the course as is like her level of support is one of the things that like, made me not want to not take

COMM 2020. Because like, I didn't do well. COMM 2010 I was like, 'Should I even do 2020?' But it's a prereq, so I like, needed to. But like, so her support is definitely something that I've like, loved. And it's one of the reasons that I've stuck with it.

### **Finding 1 Implications**

Based on the information presented in Finding 1, it appears that these courses provide learners with ample resources and metacognitive support to achieve success (Hauser et al., 2012; Peck et al., 2018). While Sub-finding 1.1 indicated that COMM 2010 might be students' first experience with a high-stakes online asynchronous modality, Sub-finding 1.2 suggested that course resources, design, and delivery provide students with adequate learning support. Finally, based on Sub-finding 1.3, the course also appears to support and cue students in deploying learning and study strategies related to self-testing, testing, and anxiety.

### **Finding 2: Many students reported deploying self-testing and testing strategies in COMM 2010 and COMM 2020.**

#### ***Self-Testing***

Responses to the student survey indicated that many students likely engaged in different forms of self-testing while in the course. Most survey respondents indicated either some or most of the time they: 1) actively connected new accounting concepts to things they already knew (92.4%), 2) stopped when reading and asking themselves, "Does this make sense?" (93.3%), 3) engaged in self-explanation for difficult accounting questions (90.5%), 4) verbalized steps in accounting problems (74.3%), and 5) summarized chapter concepts in their own words (90.5%). Fewer respondents indicated they used the Smartbook self-testing options; 54% of respondents utilized the Smartbook Recharge quiz or the Practice quiz option either some or most of the time (see Table 4.2).



**Table 4.2***Survey Responses for Self-Testing Questions (n=105)*

	Not very typical of me		Somewhat typical of me		Fairly typical of me		M	SD
	n	(%)	n	(%)	n	(%)		
I actively tried to new accounting concepts with things I already knew.	8	(7.6%)	48	(45.7%)	49	(46.7%)	2.39	0.62
As I read the course e-book, I routinely stopped and asked myself, "Does this make sense?"***	7	(6.7%)	30	(28.9%)	67	(64.4%)	2.58	0.62
As I learned difficult accounting <b>concepts</b> , I explained them in my own words.	10	(9.5%)	51	48.6%)	44	(41.9%)	2.32	0.64
As I worked through accounting <b>problems</b> , I verbalized each step.	27	(25.7%)	42	(40.0%)	36	(34.3%)	2.09	0.77
I wrote down the main ideas of each chapter.	10	(9.5%)	23	(21.9%)	72	(68.6%)	2.59	0.66
I utilized the Smartbook Recharge Quiz option.	48	(45.7%)	33	(31.4%)	24	(22.9%)	1.77	0.80
I utilized the Smartbook Practice Quiz option (accessed through Smartbook Reports).	48	(45.7%)	24	(22.9%)	33	(31.4%)	1.86	0.87

\*\*\*Note. Only 104 respondents answered this question.

### **Test Preparation and Testing**

Student survey responses indicated that many respondents likely employed effective testing strategies while in the course. Most respondents indicated that either some or most of the time they: 1) studied for several days before each exam (86.6%), 2) re-checked their computations when solving problems (98.1%, 3) eliminated wrong answers before choosing the correct answer for multiple-choice items (93.3%) and 5) sought to understand what they did wrong for missed items (96.2%). Fewer

respondents (74.3%) indicated they reviewed their notes from the previous chapter before starting a new chapter (see Table 4.3).

**Table 4.3**

*Survey Responses for Test Preparation and Testing Questions (n=105)*

	Not very typical of me		Somewhat typical of me		Fairly typical of me		M	SD
	n	(%)	n	(%)	n	(%)		
I reviewed my previous notes before starting a new chapter.	27	(25.7%)	49	(46.7%)	29	(27.6%)	2.02	0.73
I studied each day for several days before each course exam.	12	(11.4%)	21	(20.0%)	72	(68.6%)	2.57	0.69
When I solved accounting problems on exams, I re-checked my computations for each step.	2	(1.9%)	26	(24.8%)	77	(73.3%)	2.71	0.49
When working through multiple-choice items, I first eliminated wrong answers before selecting the correct answer.	7	(6.7%)	29	(27.6%)	69	(65.7%)	2.59	0.61
After I received my corrected test, I tried to understand what I did wrong.	4	(3.8%)	23	(21.9%)	78	(74.3%)	2.70	0.53

However, results on a follow-up multi-select item indicated that several respondents chose not to use all of the testing resources the course provided. In this survey item, respondents were asked to select all the ways they prepared for tests in the course. 95.2% indicated they worked on practice exam questions. 94.3% of respondents indicated they reviewed their own notes to prepare for tests. 75.3% indicated they re-did the chapter practice questions, and 72.4% indicated they reviewed the previous chapter content and exam questions. Fewer than half of the respondents (46.7%) indicated that they reviewed the problem walk-through videos. 42.9% indicated they skimmed the textbook, 38.1% said they thoroughly read it, and 16.2% completed the end-of-chapter demo cases. Fewer respondents

indicated they sought help before tests: 22.9% posted questions on MS Teams or worked with a study group, and 15.2% met with a course TA (see Table 4.4).

**Table 4.4**

*Survey Responses for Multi-Select Test Preparation Question (n=105)*

<b>To prepare for an upcoming exam, I routinely (check all that apply):</b>	n	(%)
skimmed the textbook chapters.	45	(42.9%)
thoroughly read the textbook chapters.	40	(38.1%)
reviewed my own notes.	99	(94.3%)
reviewed the problem walk through videos in the LMS	49	(46.7%)
re-did the connect chapter practice questions and homework in “study attempt” mode.	79	(75.2%)
worked on current practice exam questions.	100	(95.2%)
reviewed previous chapter exam content and questions.	76	(72.4%)
posted questions on Teams or worked with a study group.	24	(22.9%)
met with a course TA.	16	(15.2%)
completed the end-of-chapter demo cases.	17	(16.2%)

During the student interviews, Bryony and Iris confirmed the survey results by identifying the practice exam questions to be the most helpful for exam preparation. Bryony also re-read the textbook chapters when preparing for tests, and they both valued reviewing the problem walk-through videos when preparing for exams:

Oh, yes. Yes, I would watch all the videos, I would. I would do all the practice problems.

Whenever I started getting really serious about it, I would reread the chapters. Look over the practice problems and homework problems of each chapter again... Yes I think those [practice

problems] are the most helpful thing for the exam. The practice problems like the practice exam problems, yes, those are probably the most helpful things for studying for exams because there because the there's kind of a disconnect between the homework problems, and the exam questions like they're different.

Iris found that watching the problem walkthrough videos before working on practice problems worked well for her:

Yeah, I watched those [problem walk-through videos], pretty much every like, I think there was maybe one or two that I didn't watch just because I understood the concepts like right off the bat. But, definitely like, I would go through them every single time and like watch them before I did the practice and the homework problems.

### **Finding 2 Implications**

Based on the information presented in Finding 2, it appears that many students in these courses are likely deploying some self-testing and testing strategies in these courses. However, it is likely that a significant number of students may not be deploying essential self-testing and testing strategies, i.e., verbalizing problem steps (Chi et al., 1989; Renkl et al., 1997), interleaving practice with the Smartbook quiz options or reviewing previous notes (Brown et al., 2017; Helsdingen et al., 2011b, 2011a; Rohrer & Taylor, 2007), and reaching out to peers or a course TA for help.

### **Finding 3: Many students reported experiencing anxiety while in COMM 2010.**

As previously mentioned, the university experienced a horrific campus tragedy that impacted the entire school community. Therefore, this tragedy may have triggered or exacerbated anxiety for these participants, which may have influenced these findings.

The student survey asked respondents if they experienced anxiety while in the course. 72.3% of respondents indicated experiencing anxiety either some of or most of the time. Out of those, 14.5%

indicated they could not manage their symptoms effectively, and 57.9% indicated that they did not seek help for anxiety while in the course (see Table 4.5).

**Table 4.5**

*Survey Responses for Anxiety Questions (n=105)*

	Not very typical of me		Somewhat typical of me		Fairly typical of me		M	SD
	n	(%)	n	(%)	n	(%)		
I experienced symptoms of anxiety while I was in COMM 2010 (e.g., stress, fear, helplessness, negative/racing thoughts, or difficulty concentrating).	29	(27.6%)	36	(34.3%)	40	(38.1%)	2.10	0.80
<i>Out of 76 students reporting some or frequent anxiety:</i>								
When I experienced anxiety in the course, I was effectively able to manage my symptoms.	11	(14.5%)	42	(55.3%)	23	(30.3%)	2.16	0.65
I actively sought help for my anxiety while I was in the course.	44	(57.9%)	19	(25.0%)	13	(17.1%)	1.59	0.76

All six student interview participants reported experiencing anxious feelings at some point during the course. In their student survey responses, Bryony, Heather, and Iris reported feeling anxious in COMM 2010 course most of the time. In her interview, Bryony shared her struggle with a diagnosed anxiety disorder, for which she receives medical treatment. Violet did not report experiencing anxiety on her survey, but in her interview, she stated she felt anxious at times throughout the course. In their surveys, Daisy and Rose reported feeling anxious at times. In her interview, Rose shared that she struggled with depression and anxiety while she was in COMM 2010:

Um, this might, I don't know if this would be like, useful in your scope, but I just know that, like, last semester, like I know, for me, it was just really hard in terms of like, like anxiety and like depression, stuff like that. So that might have like, in terms of like, my specific research, like

what the insight provides you there were definitely altered by like, the sheer amount of like, anxiety I was feeling.

***Sub-finding 3.1: For those students who reported experiencing anxiety, there were likely various anxiety triggers associated with the course.***

Student survey respondents who indicated experiencing anxiety were asked to identify their anxiety triggers. 65 participants provided free-response answers corresponding to five general categories: tests and testing, homework/not understanding content/grades, time management, transactional distance, and other triggers. A few answers corresponded to two or more categories. Respondent answers indicated that tests and testing was the most frequent anxiety trigger, followed by homework/not understanding content/grades, time management, transactional distance, and other (see Appendix S).

The student interview participants also identified feeling unsure about their content knowledge, testing and exams, grades, and the high-stakes prerequisite nature of the course as significant anxiety triggers.

Daisy, Heather, Iris, and Violet stated that they felt anxious at different points throughout the course because they lacked confidence in their mastery of the content, i.e., the ability to solve problems or felt unprepared for course exams, which appeared to be associated with test anxiety. Four participants indicated that their anxiety was particularly acute when taking an exam, especially if they lacked confidence in their content mastery. Iris expressed feeling anxious because sometimes, she felt like she experienced knowledge gaps when taking exams:

And like I feel a high sense of anxiety, because I'm like, 'Okay, I understood everything that was on the review sheet'. But did I understand everything? Like, did I miss something? And just like, sometimes I was like, 'How will I know if I like, don't know, because this like the first time I'm seeing this material?' So like, I don't know, if I don't know something, and I just missed it.

Daisy also questioned herself at times—even wondering if she could be successful in learning accounting online:

So like, basically, kind of there was I remember, there was one exam that I studied super hard for, and I thought I kind of understood it, and then I very much failed the exam. And after that, I was like, oh, shoot, like, ‘Does this mean that I cannot do remotely well in this class?’ Because it was a good, good chunk of grade. So then I was kind of like, oh, goodness, the final is going to be even harder than this, like, I don't know.

Perceiving their own knowledge deficiencies, spurred Iris and Heather to seek help from outside of the course. Iris used Khan Academy, and Heather used Wall Street Prep to ameliorate their misunderstandings and knowledge gaps.

Bryony shared that her test anxiety increased throughout the course, and with each subsequent exam, she felt increasing pressure to do well:

So I was just very worried about the final exam. And the some of the last exams as well. Because after, after the second exam score, I really needed to do a lot better on the other ones in order to keep a decent grade in the course. So yes, lots of anxiety about the tests. Especially after the one that I didn't do so well on.

It is important to note discrepancies in what students reported in their interviews regarding course resources and anxiety from lack of content mastery. Bryony, Daisy, Heather, and Violet stated that the courses provided ample resources to learn the content. And Bryony and Iris identified practice problems as the most helpful for exam preparation. Yet, these same participants reported feeling underprepared for course exams—with Heather and Iris even seeking outside resources for help.

Iris and Daisy may have clarified this discrepancy. They believed the practice and homework problems were less complex and not always aligned with the exams. Daisy explained her thoughts about this perceived discrepancy between the practice problems and exam questions.

But maybe like more problems that are geared towards the way the exams are structured, because our like practice and homework problems are, are a little bit like, actually quite more straight way more straightforward than like our exam. problems would be and we get like, practice for that as well. And I get the whole like, building up to that starting off simple and then getting more complicated. But maybe like a little bit more of a bridge between the way questions are now.

In addition, challenges with time management during exams may also trigger anxiety for some students. Violet shared that she struggled with time management, and left some exam questions unanswered as a result:

Like even if I was generally good at it, I was just just a little like nervous around the actual tests, because sometimes the test isn't what you expect, or, or just the fact that it's timed. Because like our assignments, as long as like, it's before the deadline, we can take as much time as we need. Whereas the tests tend to be, I forget how long but like only a couple of hours. And so then I would just be like, anxious about like, running out of time. And a couple times, I did run out of time. So it was more, I think, was more of like the time aspect and being been afraid that I would forget something and have to go look at my notes and then run out of time... And, but I did have a couple of exams where I left some questions blank just because I didn't have time. So yeah, I think that's what really caused a lot of anxiety.

Rose also shared that taking time to find resources to answer exam problems interrupted her testing cadence, flow, and focus on exams:



And also like with the with the tests being there, like online, and you can like, look up anything you need to that also kind of like throws off like the cadence of your exam. Like for me, I have to be super focused to take a test exam. So I like need to just know everything. So then when I'm like, Oh, I forgot the formula, like, like, going through my notes are like looking something up like that. Really, just like that really just interrupts like your flow focus.

Finally, the relationship between the participants' course performance and future goals also appeared to be anxiety triggers. Students may feel internal and external pressures to succeed in these courses, and those pressure could activate anxious feelings. Bryony shared that her anxiety in this course connected her disappointment with her COMM 2010 grade.

But there's like, it was my worst grade, all of [my grades]. So that that's kind of like frustrated me a little bit by like, a couple of marks, like, besides the B, it's been an A-minus or an A for every course. So that was kind of frustrating for me. And I'm not sure if it's just accounting or if it's because of the class, how it's structured. But yeah, that's weighed on me a little bit.

Rose confirmed that since this course is a required prerequisite for entry to the commerce school, many students likely experience tremendous pressure to do well.

Yeah, and it's also that this is a [commerce school] prereq. And that like, quadruples the pressure on any student that's taking it because not only like, do you have to do good like, just for your GPA but like, [the commerce school], which is for a lot of students like, like me, I didn't come in being like, [commerce school, commerce school], I like took a bunch of other classes. And I was like, hey, like low key like, I can incorporate all of these into [the commerce school]. So I was like, okay, I want to give it a chance. But I know some students that were like, 'This is it like this is the end all be all'...I can imagine the pressure was significantly more intense because they needed this class, and they don't have a plan B or anything.

***Sub-finding 3.2: For those students who experienced anxiety, they likely sought help from various sources outside of the course.***

Student survey respondents who indicated experiencing anxiety were asked to identify from whom they sought help to manage their symptoms. 36 participants provided open-ended answers corresponding to six general categories: family, friends, professional/medication, self, TA/instructor, or other, and a few answers corresponded to two categories. Respondent answers indicated that friends were the most sought source for help, followed by a family member, professional/medication and self, Instructor/TA/tutor, and other sources (see Appendix T).

**Finding 3 Implications**

Based on the information presented in Finding 3, it is likely that many students experienced anxiety while they were in COMM 2010, with a significant number unable to sufficiently manage their symptoms or choosing to seek help. While the causes of anxiety may have come from outside of the course, Finding 3.1 suggests that some students experienced anxiety due to the course, possibly from internal pressure to complete a high-stakes pre-requisite (comm school acceptance) successfully. Additionally, it appears that test anxiety seems to be the most prevalent and related to feeling unprepared for tests (lack of content knowledge), which seems to be inconsistent with information that points to adequate resources to learn course content. The timed nature of tests also appears to be an anxiety trigger, which may negatively impact students' exam performance (Onwuegbuzie & Seaman, 1995; Orfus, 2008). Finally, Finding 3.2 indicates that if they experienced anxiety, students most likely turned to their friends or family for help.

**Finding 4: The structure and dialog may increase the transactional distance in these courses.**

The course instructor acknowledged that the large size of these courses makes it virtually impossible to meet the needs of every student. During her interview, the instructor expressed her frustration at being unable to personally connect with every student who wanted to meet with her:

Because I feel like especially now, they all want a piece of my time. And I mean my hours are... I've opened more hours and at a certain point, I just can't meet with everyone. How effective would be meeting individual... I feel like the student I met with this morning, she was just like, 'Okay, just talking with you is comforting.'

Indeed, the responses to the student survey appeared to confirm the instructor's observations. 60% of student survey respondents indicated they did not directly communicate with the instructor while in the course. For survey respondents who indicated they did not personally connect with the instructor, a follow-up question was displayed, asking why they choose not to do so. 52 participants provided free-response answers corresponding to five general categories: no need to connect, experienced a barrier to connecting, did not have the time, connected with a TA, and other reasons, and a few answers corresponded to two categories. Respondent answers indicated that not having a reason to connect was the most frequently cited reason, followed by experiencing a barrier, not having time, other, and connecting with TA (see Appendix U).

For survey respondents who indicated they did personally connect with the instructor, a follow-up question was displayed, asking why they chose to do so. 40 participants provided free-response answers corresponding to five general categories: to discuss tests/grades, to seek help, to establish a relationship, for emotional support, and other. One answer corresponded to two categories. Respondent answers indicated that discussing tests or grades was the most frequently cited reason, closely followed by seeking help, and establishing a relationship. Fewer respondents cited emotional support or other reasons (see Appendix V).

During their student interviews, Bryony and Rose shared that the impersonal nature of the large asynchronous course did create a barrier to communicating directly with the instructor. Although acknowledging the instructor welcomed personal communication, neither Bryony nor Rose connected with the instructor in COMM 2010, and Bryony does not plan to reach out in COMM 2020. However,

despite this barrier, Rose plans to make a personal connection this semester—but she did share why she feels uncomfortable connecting with the instructor:

And I know like, sometimes, without some of my friends, like even me, sometimes, if the class is like, in person, and you can see the professor, it's a little bit easier to reach out to them. But this time, like, sometimes you just don't form a connection with your teacher at all. That's not I don't find that [the professor's] fault at all, because she has tried, but like the student reaching out is, like a whole another thing after that. Like I had a hard time reaching even though it was like, Oh, I feel like she could really help me. I'd be like, no, like, the class is just too big. It's like kind of impersonal. I just, I just never felt like it was worth making the effort to reach out. But this semester, I was like, I'm not making that mistake again.

***Sub-finding 4.1: Smaller student groups appeared to decrease the transactional distance in these courses.***

During her interview, the instructor indicated her desire to build a greater sense of peer community in these courses, and reasoned that a greater sense of community could reduce the effects of transactional distance:

I just am concerned that some students are feeling isolated. And having been an online student, I know those courses where you do feel isolated and others where you feel that sense of connection, and I want to think about more ways that I can build that connection. And it's so hard, right, because I don't know what's going on. When I talk with students, some say, "Oh, I have this small group. All of my roommates are taking this class, and we're meeting together." And that's great, and those are those informal peer-to-peer connections they're making. And maybe that's all they need. But I'm sure there are students that don't have that, and where am I missing that? I don't want to force it on them, but where can I do that? So I think there's some opportunity in Teams. It's just a matter of creating those opportunities.

To enhance the learning community within these courses, the instructor indicated her plans to assign students to specific TA groups in the spring 2023 course iterations, wherein a specific TA would be their direct contact for help, as well as their proctor for each exam.

The student interview participants also indicated that smaller groups might reduce transactional distance. Violet shared that she feels isolated when she tries to go it alone, but working with others makes her feel more comfortable with the course. She also offered that small groups could be a viable option for lessening these feelings:

But at the same time it does feel very like isolating unless you like pair up with somebody and work together on things. Because I feel like that it makes it feel more like more like you have classmates like once you get with people together and work on something. It feels more like that traditional classroom aspect. But at the same time, I always think, Oh, she has so many students, I'm not gonna, you know, so just having someone who's more specific to me, or, like maybe like a smaller group of people, you just contact one person, and another group of people contact another person. Or something like that, just to make the class feel smaller. I think?

Daisy and Bryony formed their own groups within the course and identified their friends as the main source of course support for checking their work and clarifying misunderstandings. Daisy described her experiences as part of collaborative self-formed study groups while enrolled in COMM 2010.

That was helpful, I think, because we had kind of like, we had study groups that we were put into, but a bunch of my friends were also taking the class. And so like having a group chat, where we could like ask each other questions and like, basically, kind of collaborate when we were confused, for like, you know, studying and homework and things like that was super helpful, because I know that if I didn't have anyone to talk to you about the concepts I was confused about that would have made it a lot more difficult.

However, Iris explained that she finds it difficult to make peer connections in the asynchronous modality, as she explained the social challenges in forming a study group:

But it's like, it takes a minute to like, figure out who's actually in this class, like, put together study groups and things like that. So like, definitely being like such a large online class, like I've missed peer interactions...The only thing is like, it's definitely a little bit of like a social hill you have to climb over to like start interacting with it.

Despite these challenges, Iris also mentioned that MS Teams helped her make peer connections and could help students with finding others and forming study groups.

***Sub-finding 4.2: The relatively small amount of instructor-generated content may increase the transactional distance in these courses.***

Bryony, Daisy, Heather, and Iris identified instructor lectures as critical missing elements in COMM 2010 and COMM 2020. Each week, both courses include a 5–6-minute chapter overview video, one or two 8–12-minute problem walk-through videos (presented by a former course instructor), and a 25–45-minute prior week review session (recorded live). Yet, these participants believed this was not enough “facetime” with the instructor. Iris described her need for an instructor-led lecture by stating: “But so COMM 2010 definitely just the fact of like, there was no lecture, and I use like, for me, I lectures, I use them as kind of my like, guiding hand.” Daisy thought a flipped classroom-like structure could help the course feel more like an in-person experience. Heather, who doesn’t like reading textbooks, would have rather watched more videos explaining each chapter section in depth:

I would say for me, like I mentioned earlier, like, I really enjoy watching lectures, because I'm not as much I don't enjoy reading the textbook as much. So maybe if she summarized not, I'm not sure how to say this. Maybe, like did more videos like she does weekly, like just like breaking down the chapter a little bit more maybe? And summarizing it that way, versus doing the big

summary of the chapter and like a couple practice problems that would be helpful and we need just to watch it. And watch her explain that.

Bryony explained how attending an outside accounting lecture helped her make sense of course concepts:

I think a lecture would be very helpful. Like, I attended a, like a women's investment banking symposium, like this past week, but they brought in like, an interviewer, technical prep, like educator, and he taught us like, accounting basics for interviews, and just having a person like talking to me, like lecturing on in person on the spot, just, I like everything clicked. Like, it was basic accounting. And I was like, wow, that that makes so much more sense than what I was, I've been learning accounting all semester. And this is the first time I've like, actually had a moment where it like, all clicks.

#### **Implications for Finding 4**

The negative effects of transactional distance on students in asynchronous learning have been established in the literature (Moore 2013; Moore & Kearsley 2011). Based on the information in Finding 4, the instructor and student interactions are negatively impacted by the large size of these courses. Many students likely complete these courses without personally connecting with the instructor and experience a barrier in doing so. Moreover, transactional distance also appears to impede peer interactions. However, Finding 4.1 suggests that some students likely negate these effects by forming their own study and support groups to check their work and clarify their misconceptions. Finding 4.2 indicates that the current level of instructor-generated content may widen the transactional distance gap in these courses.

#### **Discussion**

This inquiry revealed that COMM 2010 and 2020 are meticulously designed and delivered, which likely lessens students' cognitive load (Broadbent, 2017; Peck et al., 2018), by allowing them to

dedicate their cognitive processing power to learning a new and complex subject. In addition, there are multiple points of metacognitive support pertaining to self-testing, testing, and anxiety through instructor cues and course resources, and many students reported deploying learning strategies related to these domains.

However, despite sound instructional design and adequate support, some students reported challenges with establishing effective learning strategies, time management, testing, and anxiety. This incongruity leads one to consider why such gaps exist for these students. Do these gaps pertain to the students themselves—that is, are some students simply choosing not to do certain things that could bring them success? Or does the gap pertain to the course—are there untapped areas of student support that should be implemented? Or does the gap exist within something else entirely?

Sub-finding 1.1 reveals that although most students in these courses are familiar with online learning, this is the first time they are managing their learning in a course designed to be online and asynchronous. This appears to be somewhat disorienting for some students; upon entering the course, they already knew how they learned best in an in-person, synchronous modality, but realized their previous methods did not produce the same learning results in an asynchronous online modality. Yet, five of the six interview participants stated that after experiencing this dissonance, they adapted their approach by revising their learning strategies and ultimately finding success. Perhaps, it is in this initial struggle where the real metacognitive growth occurs—transforming these students into confident, successful, and self-regulated online learners.

However, if some students do require more metacognitive support, then how much is enough? Several researchers argue that too much support actually undermines students' long-term metacognitive skill acquisition (Marquès Puig et al., 2022; Miller et al., 2020; Mountain et al., 2022; O'Loughlin & Griffith, 2020; Schumacher & Ifenthaler, 2021). If that is true, at what point are we doing more harm than good? As noted in sub-finding 1.3, there are numerous supports related to self-testing,



testing, and anxiety in these courses. For instance, the course announcement stream contains weekly messages that cue students to use distributed practice and interleaving in test preparation. Also, the Smartbook provides students with extra practice by tailoring review quizzes to meet one's specific needs. And the "How to Learn" module provides students with additional resources they can employ to address their learning gaps. So, the question is, are there additional opportunities to provide metacognitive support to students without becoming overly prescriptive in delivering such support?

But, when wrestling with these questions, we must also consider the level of anxiety reported by the participants. This is not a phenomenon unique to these courses; student mental health challenges are increasing across the U.S., and trends indicate that they will continue to increase (Colarossi, 2022). In addition, the high-stakes nature of these courses is also anxiety-producing. These courses exist in a unique space—they serve as prerequisites for admission to a highly competitive school within a competitive university, wherein many students likely feel tremendous pressure to be successful because they believe their future is dependent on their course outcomes. Finally, a campus tragedy resulted in grief and anxiety across the school community, compounding students' existing stressors.

When considering issues and contexts pertaining to student anxiety, we must also consider the role of transactional distance in these courses. In this study, most participants who reported feeling anxious identified testing or not understanding the content as the cause. Within an in-person, synchronous modality, students experiencing these anxiety triggers can seek help from the instructor, a TA, or a peer. However, in an online asynchronous modality, a barrier exists to such communication (Moore, 2013a; Moore & Kearsley, 2011). Moreover, research suggests that transactional distance is associated with increased student anxiety in this modality (Hauser et al., 2012), especially when learners complete quizzes or tests (Sato et al., 2019). Therefore, transactional distance may be a contributing factor to students' anxiety within these courses.

## Summary

In this chapter, I presented data gathered from course reviews, one instructor interview, student survey responses, and six student interviews. By analyzing and synthesizing these data, I identified the following findings and sub-findings:

- Finding 1: COMM 2010 and COMM 2020 are well-designed, asynchronous online courses that provide ample resources and support for students to learn the content.
  - Sub-finding 1.1: These courses may be students' first experience with high-stakes online asynchronous learning.
  - Sub-finding 1.2: Students may have entered the course with established learning strategies but revised these methods to enhance their learning.
  - Sub-finding 1.3: These courses provide students with multiple support points related to self-testing, testing, and anxiety.
- Finding 2: Many students reported deploying self-testing and testing strategies in COMM 2010 and COMM 2020.
- Finding 3: Many students reported experienced anxiety while in COMM 2010.
  - Sub-finding 3.1: For those students who reported experiencing anxiety, there were likely various anxiety triggers associated with the course.
  - Sub-finding 3.2: For those students who experienced anxiety, they likely sought help from various sources outside of the course.
- Finding 4: The structure and dialog may increase the transactional distance in these courses.
  - Sub-finding 4.1: Smaller student groups appeared to decrease the transactional distance in these courses.
  - Sub-finding 4.2: The relatively small amount of instructor-generated content may increase the transactional distance in these courses.

## Chapter 5: Recommendations

In reviewing the data generated through the course review, instructor interview, student survey responses, and student interviews, several themes emerged that served as the basis for the findings I presented in Chapter 4. These findings, when considered with the literature presented in Chapter 2, allowed me to identify areas of strength, as well as areas of growth within COMM 2010 and COMM 2020 courses. I formulated these recommendations to enhance these courses and to better the diverse learning needs of future students. The literature highlighted the challenges of asynchronous online learning, supporting learners' metacognition within these modalities, and specific learning and study strategies assessed by the LASSI inventory. Therefore, it is within the literature that I have grounded both the commendations and recommendations that I provide to the COMM 2010 and COMM 2020 stakeholders.

I begin this chapter with two commendations for the courses, as my findings suggest that these courses are well-designed, managed, and delivered. I then provide recommendations for modifying these courses to enhance the current level of learner support, which could improve learning outcomes. Since these recommendations range from minor adjustments to content creation, I have organized these from simple and straightforward to more complex and resource intensive. An overview of these recommendations is listed in Table 5.1.

**Table 5.1**

*Commendations and Recommendations for the COMM 2010 and COMM 2020 Course Stakeholders*

Commendations	
Commendation 1	COMM 2010 and COMM 2020 exemplify undergraduate online asynchronous learning experiences.
Commendation 2	The COMM 2010 and 2020 instructor appears to enhance the course experience for students.

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Recommendations	
Recommendation 1	Provide students with more time to complete course exams.
Recommendation 2	Continue to expand the community and deepen peer relationships with the MS Teams platform.
Recommendation 3	Integrate additional instructor-generated lectures into both courses.

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### **Commendations**

COMM 2010 and COMM 2020 are well-designed and delivered online asynchronous courses that appear to adequately meet stakeholders' needs. First, these courses enable the comm school to offer prerequisite accounting courses to many students simultaneously and consistently. Second, these courses appear to support students' knowledge acquisition and deployment of metacognitive learning strategies.

***Commendation 1: COMM 2010 and COMM 2020 exemplify undergraduate online asynchronous learning experiences.***

My findings revealed that these courses are designed and delivered in a manner that likely maximizes students' learning while also limiting the demand on their cognitive processing to navigate this digital learning environment. The courses are intuitively organized and explicitly communicate with learners (in multiple locations and in multiple formats) about where to find all learning materials, how to communicate with the instructor, testing procedures, the grading process, how to access help, and course and institutional policies. Learning content is highly structured (Moore 2018) and is chunked into manageable amounts (weekly learning units), which consecutively builds upon prior learning as it increases in complexity. To enable active learning and knowledge generation, course materials are presented in various formats, i.e., reading, video, and practice activities. Each learning unit begins with an instructor overview video, wherein she introduces new topics while also explaining how these topics

connect with previous learning. In addition, each week, students can engage in enrichment activities to make deeper meaning and facilitate knowledge transfer. The Smartbook also provides students with opportunities to track their progress with adaptive technology and feedback, as well as various ways to review difficult concepts and practice for course exams. Since exams comprise the most percentage points one earns toward their grade (75%), instructor-generated exam review materials are comprehensive and provide students with abundant practice problems and associated resources with which to prepare.

These courses also appear to support students' deployment of metacognitive strategies. As I noted in the findings section, there are multiple support points related to self-testing, testing, and anxiety. In addition, these courses also include a module titled *How to Learn* that provides students with optional multiple resources about how to study using active learning strategies and managing test anxiety. I also observed metacognitive supports beyond the bounds of this study—most notably for time management. Both courses include a guide to assist learners in planning their weekly learning through a sample schedule and step-by-step instructions. And due dates for course deliverables occur throughout the week, providing structure to keep learners on track.

This commendation does beg a question—given that the course is so well designed, would any changes substantively enhance the future learners' experiences? In response, I would argue that COMM 2010/20 learners likely represent a varied range of learner autonomy (Moore, 2018). Moreover, the highly structured course materials and primarily one-way communication (i.e., instructor-to-student) likely widen the transactional distance gap, which presents learning management challenges for less-autonomous students (Moore, 2018). However, when considering that each semester each course has 500-700 students enrolled, it is unrealistic to expect these courses will provide the appropriate course structure and adequate dialog to meet the specific needs of each student. Therefore, if this commerce

school continues to offer COMM 2010/20 in the current format and structure, it is essential to find ways to help less-autonomous learners manage their learning successfully.

***Commendation 2: The COMM 2010 and 2020 instructor appears to enhance the course experience for students.***

Throughout the student interviews, each participant shared highly positive feedback about the course instructor, with few stating feeling personally supported by her, especially in the weeks following a campus tragedy. These are impressive findings because during full academic semesters (spring and fall), the instructor delivers these courses to over 1,000 undergraduates at a time. As both an instructional designer and accounting professional, the instructor understands the diverse needs of this learning population and is committed to meeting these needs, which she demonstrates in her work. For example, the instructor and TAs offer several hours of in-person and online office hours each week. In addition, all student questions posted in Teams are answered within 24 hours. However, the instructor also recognizes that these dialog methods are limited, and she is aware that there are likely many students who experience feelings of isolation. Therefore, she is continually considering ways to build stronger student communities and more peer-to-peer interaction to lessen transactional distance within these courses.

The instructor's teaching philosophy is based on honor, opportunity, and professionalism, and she has woven these themes throughout the courses. She communicates how honor is grounded in integrity, and accounting is what maintains integrity in the business world. Furthermore, she wants students to understand that integrity and ethics apply to whatever business path they choose to pursue. The instructor also provides students with enrichment opportunities, i.e., videos or live webinars, to learn about the accounting profession beyond the textbook, to recognize how it applies to their lives, and to understand its essentiality to all business careers. As far as professionalism, she models professional communication to students through her email correspondence and by communicating

appropriate behavior and modeling best practices for MS Teams—allowing students to practice with a platform they could use in a future workplace. The instructor’s holistic approach to teaching these courses likely provides students with the essential knowledge and skills that transcend accounting as they pursue various tracks at the comm school.

### **Recommendations**

The following recommendations are grounded in the findings presented in Chapter 4. As I noted in the commendations above, these courses exemplify online asynchronous learning, and the course instructor enhances the course experience for students. These recommendations address student anxiety and transactional distance within the COMM 2010 and COMM 2020 courses.

#### ***Recommendation 1: Provide students with more time to complete course exams.***

One common theme that emerged in the findings was that many students are likely experiencing test anxiety in these courses. Since these offerings are prerequisites for admission to the comm school, and course exams comprise 75% of students’ final grades, it is unsurprising that the high-stakes nature of these exams causes students to feel anxious. Some students might even feel that their entire future is contingent on achieving success on each exam.

Upon examining individual student responses regarding test anxiety, several identified the test timer as anxiety-inducing, which may negatively impact their performance on these exams (Onwuegbuzie & Seaman, 1995; Orfus, 2008). It is also likely that completing exams in the subject of accounting may itself be anxiety-inducing, as students could be grappling with new knowledge and ways of thinking. Indeed, one student interviewee described the process of learning accounting as akin to “learning a new language.” If other students are experiencing similar feelings, it is understandable that a timer ticking down during an exam increases these feelings of uncertainty. Also, when considering learning diversity, all students have, in essence, unlimited time to work through practice and homework problems, it is therefore likely that some students require more time to complete exam problems than

others. Moreover, simply giving students more time to complete course exams may alleviate some of their testing anxiety. For these reasons, I recommend allowing students to request more time to complete exams. Exam times could be extended for all students, or students could either request more time before an exam or request additional time intervals (e.g., 15, 30 minutes) during exams.

***Recommendation 2: Continue to expand the community and deepen peer relationships with the MS Teams platform.***

During my interview with the course instructor, she demonstrated how she was currently using MS Teams, which is integrated into both courses through the learning management system (LMS). MS Teams uses channels to organize information and conversations. Each course includes a general channel where the instructors and TAs can post announcements, and students can access the syllabus and other documents. The instructor has also created a channel dedicated to administrative course questions, each learning unit (weekly chapter), and each exam. Within these channels, students can post specific questions. The instructor also maintains “professional careers” and “student opportunities” channels. While these channels provide students with help and information, they do not appear to be building learning communities within the course. Interactions are brief—students post questions, which are promptly answered, and the conversations abruptly cease.

This relatively low amount of interaction is causing the instructor to consider other ways to bolster peer interaction via MS Teams. In future course iterations, she is considering assigning groups of students (~30) to specific channels to be facilitated by the same TA who proctors their exams. Since smaller groups within the course could increase dialog and decrease transactional distance (Moore, 1973), I encourage the instructor to move forward with this plan. Assigning specific TAs to interact with each group of students outside of exams could encourage more reticent students to seek help in MS Teams, and hopefully encourage more peer-to-peer interactions in smaller, more welcoming forums. I would also suggest that since students reported forming their own informal groups within the courses,



they would have the option to join these group channels with their friends or acquaintances, which might also facilitate more peer-to-peer interaction. The instructor also desires to increase peer learning by encouraging more student responses to questions within these channels, and I agree that increasing these interactions could enhance learners' experiences and outcomes (Moore and Kearsley, 2013). To encourage peer dialog, I would recommend integrating low-stakes writing and discussion prompts into the student group channels (Almer et al., 1998; Myring et al., 2014, 2014; Smith, 2001; Theide & Anderson, 2003). For example, students could be asked to post one question and answer one question posted by a peer. This exercise could open dialogue within the group while simultaneously providing students with a means to build confidence in their learning. Students could also be asked to share how they self-test and how they prepare for tests with their peers, which could help less-autonomous learners develop their own effective study strategies. Moreover, students' posts could help the TAs and the instructor identify common misconceptions or learning bottlenecks within the course (O'Loughlin & Griffith, 2020).

***Recommendation 3: Integrate additional instructor-generated lectures into both courses.***

By attending to the four essential online learning interactions to reduce transactional distance i.e., learner-to-content, instructor-to-student, peer-to-peer (Moore, 1989), and learner-to-technology interface (Quong et al., 2018), it is essential at times, to limit instructor-generated content, because too much can easily transform an online asynchronous course from a learner-centered experience to an instructor-centered experience (Sevnarayan, 2022). However, in the COMM 2010 and COMM 2020 courses, additional instructor-generated content could still maintain the learner-centered experience while also increasing instructor-to-student dialog, which in turn, could reduce the anxiety some students are experiencing (Hauser et al., 2012). In the current courses, weekly instructor content comprises a 5–6-minute overview video, one to two problem walk-through videos (presented by a former instructor and range from 8-12 minutes), and recorded prior week review sessions, which are approximately 25-35

minutes in length. The balance of weekly content is delivered through the course Smartbook, wherein students read sections, answer reading comprehension questions, and have the option to review concept overview videos produced by the textbook publisher. Student interviewees remarked that despite having ample resources to learn the content most of the time, the course experience can often feel like “you are teaching yourself.” Moore (2018) argues that these types of “teach yourself” learning experiences are high in transactional distance. Moreover, student interviewees reported seeking learning resources outside of the course at times as ways to learn more challenging concepts. These feelings and actions could potentially increase transactional distance—especially for less-autonomous students—leaving them feeling isolated and uncertain as they try to manage their learning in these courses. Therefore, I recommend the instructor create additional lecture videos for the course. These videos could be seamlessly integrated into the current course structure, as I envision them to be like the existing chapter overview videos but would guide students into a deeper dive into each chapter section. For example, the instructor could reinforce chapter content, connect the content to students’ lived experiences, cue students to use learning enrichment resources to prepare for tests and provide real-world examples to encourage knowledge transfer. Just as one interviewee remarked, “I use [course lectures] as...guiding hand,” these short, video lectures could serve as a guide to learners by facilitating deeper learning and addressing instructional gaps.

## **Conclusion**

In this chapter, I presented both commendations and recommendations for COMM 2010 and COMM 2020 stakeholders. These recommendations could likely improve already well-designed and delivered courses by enhancing the learning experience for COMM 2010 and COMM 2020 students, which could, in turn, improve their learning outcomes.

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## Appendix A

**Table 1**

*Comparison of Combined Average GPAs in COMM 2010 and COMM 2020 (2015-2022)*

<b>Course Modality</b>	<b>COMM 2010</b>	<b>COMM 2020</b>
Face-to-Face Instruction: 2015-2018	3.063	3.187
Online Instruction: 2016-2022	3.037	3.158

*Note.* Online grade data is through fall 2019, plus fall 2021 and summer 2022. Data from Spring 2020 to Summer 2021 is excluded because many students opted for the COVID-19 CR/NC grading option.

**Table 2**

*Grade Distribution in Face-to-Face and Online Instruction in COMM 2010 and 2020*

<b>Grade Categories</b>	<b>Face to Face 2015-2018</b>				<b>Online 2016-2022</b>			
	COMM 2010		COMM 2020		COMM 2010		COMM 2020	
	n	(%)	n	(%)	n	(%)	n	(%)
A+	137	5.0%	140	6.9%	195	6.3%	84	6.7%
A	409	14.9%	368	18.1%	684	22.1%	276	22.11%
A-	394	14.4%	335	16.5%	358	11.6%	166	13.3%
B+	366	13.3%	281	13.8%	337	10.9%	162	13.0%
B	467	17.0%	337	16.6%	441	14.2%	171	13.7%
B-	246	9.0%	182	9.0%	245	8.0%	121	9.7%
C+	308	11.2%	168	8.3%	182	5.9%	96	7.7%
C	307	11.2%	125	6.2%	336	10.9%	100	8.0%
C-	88	3.2%	64	3.2%	118	3.8%	32	2.6%
D+	8	0.3%	13	0.6%	81	2.6%	18	1.4%
D	10	0.4%	7	0.3%	60	1.9%	9	0.7%
D-	0	0.0%	5	0.2%	13	0.4%	7	0.6%
F	5	0.2%	6	0.3%	46	1.5%	6	0.5%
<b>Total Grades (n)</b>	2745		2031		3096		1248	

*Note.* Online grade data is through fall 2019, plus fall 2021 and summer 2022. Data from Spring 2020 to Summer 2021 is excluded because many students opted for the COVID-19 CR/NC grading option.

## Appendix B

**Table 1**

*Combined COMM 2010/2020 Average Percentile LASSI Scores (Spring 2022)*

<b>ANX</b> Anxiety	<b>ATT</b> Attitude	<b>CON</b> Concentration	<b>INP</b> Information Processing	<b>MOT</b> Motivation	<b>SMI</b> Selecting Main Ideas	<b>SFT</b> Self- Testing	<b>TST</b> Test Taking	<b>TMT</b> Time Manage- ment	<b>UAR</b> Using Academic Resources
55.07	35.24	48.34	48.80	56.85	52.92	41.90	55.37	50.42	33.17

**Table 2**

*COMM 2010/20 2022 Fall and Spring Grades with LASSI Scores Correlation and Regression Analysis Results*

LASSI Category Percentile	Spring COMM 2020				Spring COMM 2010	
	Fall '21 COMM 2010 Grade ( <i>r</i> )	<i>p</i> -value	Spring '22 COMM 2020 Grade ( <i>r</i> )	<i>p</i> -value	Spring '22 COMM 2010 Grade ( <i>r</i> )	<i>p</i> -value
Anxiety	0.314	0.000	0.305	0.000	0.251	0.094
Attitude	0.036	0.084	0.097	0.001	0.104	0.438
Concentration	0.191	0.450	0.194	0.010	0.196	0.656
Information Processing	0.113	0.008	0.195	0.667	0.122	0.595
Motivation	0.195	0.135	0.245	0.109	0.217	0.564
Selecting Main Ideas	0.182	0.021	0.194	0.281	0.107	0.114
Self-Testing	0.054	0.863	0.116	0.028	0.076	0.361
Test-Taking	0.354	0.000	0.356	0.573	0.329	0.019
Time Management	0.153	0.078	0.215	0.000	0.226	0.409
Using Academic Resources	-0.002	0.906	0.052	0.515	0.150	0.475

*Note.* In terms of significance, for Spring COMM 2020, a correlation of 0.104 or higher is significantly different from zero for a 95% confidence level. For Spring COMM 2010, a correlation of 0.17 or higher is significantly different from zero, with a 95% confidence level.

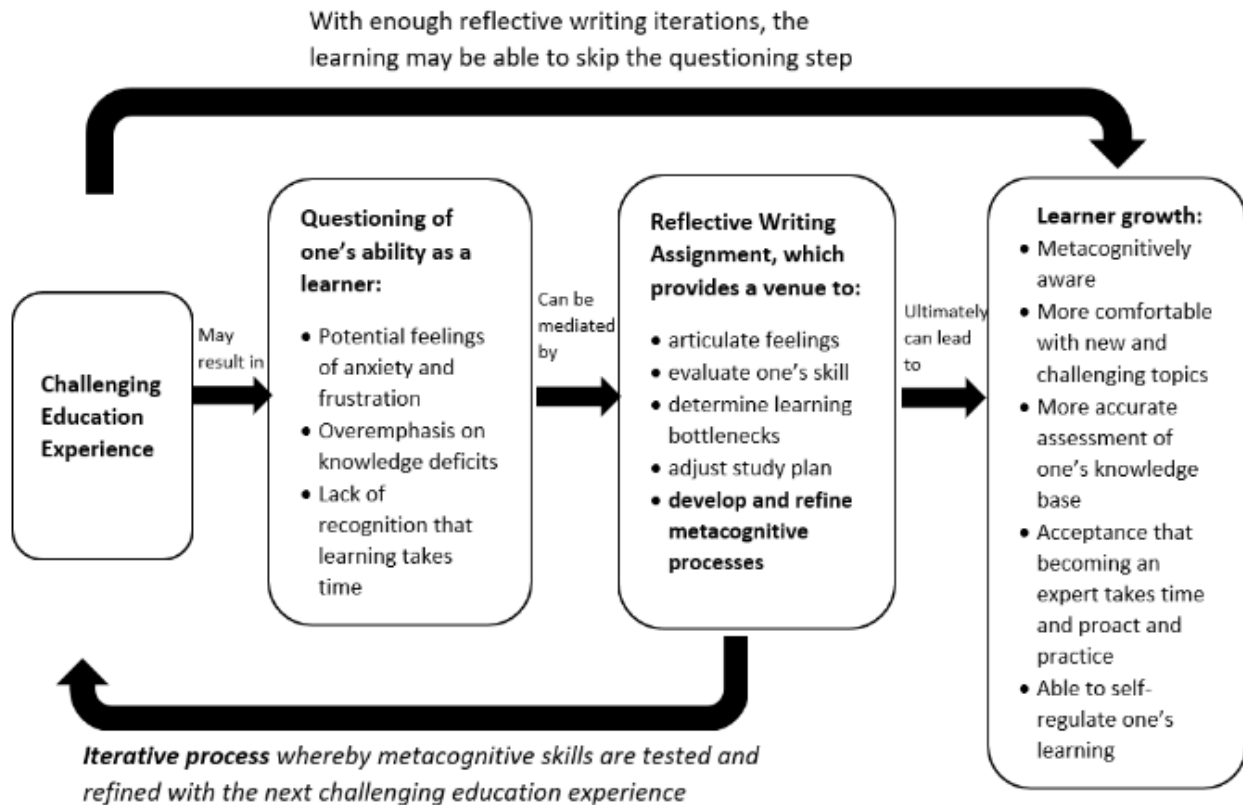
**Table 3**

*COMM 2010 LASSI Percentile Scores (Fall 2022)*

LASSI Category	0-50 <sup>th</sup>		51 <sup>st</sup> – 75 <sup>th</sup>		76 <sup>th</sup> -100 <sup>th</sup>	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Self-Testing (SFT)	336	67.9%	96	19.4%	63	12.7%
Testing (TST)	229	46.3%	99	20.0%	167	33.7%
Anxiety (ANX)	242	48.9%	126	25.5%	127	25.7%

## Appendix C

### How Reflective Writing Leads to Learner Growth Through Metacognitive Development



Note. Adapted from "Developing Student Metacognition through Reflective Writing in an Upper-Level Undergraduate Anatomy Course," by V.D. O'Loughlin and L.L. Griffith, 2020, *Anatomical Sciences Education*, 13, p. 689.

## Appendix D

### Plan for Completing This Week's Online Coursework

#### Part 1: Orient and focus by defining my tasks

**Fill in the table below:** List the items that I have to complete or turn in for points this week. Examples: take the weekly test, homework, trading project, discussion, etc. Also list due dates. Check off items that I have completed. Add more rows if needed.

Graded Item	Due Date	Completed

#### Part 2: Motivate myself

**1. Motivate myself:** [Write my reason for committing to my plan and powering through difficult moments. Examples: I want to finish my degree, I want to know this subject, I want to pass this course, etc.]

**2. My mantra or slogan:** [Write my own personal motivational slogan or saying to power through tough moments. Examples: "Just do it," "I'm worth this," "I can do this," "I can do hard things," "Challenge accepted," etc.]

#### Part 3: Weekly Coursework Completion

Follow the plan. Add my own time commitment (days of the week, time of day, etc.). Add tasks if needed.

Tasks	Time Commitment	Strategy
Organize my time to work on the course.	Mon-Tue; 10-20 min.	<ul style="list-style-type: none"> <li>• Check Blackboard announcements.</li> <li>• Read the week overview.</li> <li>• Orient myself to what I need to know and do this week.</li> <li>• Note learning objectives. I need to focus my study time on these.</li> <li>• List the number of lessons that I need to review and assignments that I need to complete. Note deadlines.</li> <li>• Set calendar reminders and alarms for test, trading project, class meetings.</li> <li>• Block out time during the week for working on the course. Plan to work in small time blocks, 20-40 minutes at a time if I don't have a lot of free time during the week.</li> <li>• Promise myself that I will not wait until deadline days to start working on the course.</li> <li>• Think of how I will control for distractions during my time for working on the course.</li> <li>• Periodically check Blackboard announcements for any updates.</li> </ul>

Study for test	Mon; time varies	<ul style="list-style-type: none"> <li>• Note learning objectives and topics for the test.</li> <li>• Quickly check my comprehension of topics that I know well. Focus on topics that I don't know well. I need to spend the most time on these topics.</li> <li>• Make topic sheets. Write definitions, concepts, and sample problems for the topic. Make a formula sheet.</li> <li>• Try to recall information without looking at notes. Explain topics in my own words. Rework homework problems. Focus on understanding and applying.</li> <li>• Set a small, topic-related, achievable goal for each study session (e.g., I will learn how to solve single cash flow problems).</li> <li>• Work in small time blocks, 20-40 minutes at a time if I don't have a lot of free time during the week.</li> <li>• If my study effort is not going well or I'm behind schedule, what can I adjust right now to keep myself on track?</li> <li>• Ask for help if needed.</li> </ul>
Review this week's new content	Mon-Sun; 2.5 to 3 hours total	<ul style="list-style-type: none"> <li>• Download the Chapter Preview and preview the learning objectives and topics</li> <li>• Download and read learning guide to know what I need to focus on in the lesson.</li> <li>• Set a small, achievable goal for each study session (e.g., I will finish Lesson 1 in this study session).</li> <li>• Work in small time blocks, 20-40 minutes at a time. Control distractions.</li> <li>• Watch recorded lectures or review Blackboard lessons. Stop and make notes by hand when I see something related to the chapter preview or learning guide.</li> <li>• Explain definitions or concepts to myself. Work sample problems if provided. Explain the problems to myself.</li> <li>• Think of how the recorded lectures or Blackboard lessons are related to the learning objectives.</li> <li>• Review my notes when I reach the end of my time block for this task.</li> </ul>
Complete Learning Guides	Tue-Sun; 30-60 min.	<ul style="list-style-type: none"> <li>• Work in small time blocks if I don't have a lot of free time during the week.</li> <li>• Work on one or two items at a time.</li> <li>• Use the learning guide as a self-test. Try to complete a question without looking at notes.</li> <li>• Check my notes or the learning content to verify my answer or if I get stuck.</li> <li>• Remember to submit it to Blackboard by the deadline.</li> </ul>
Trading Project	Mon-Sun; time varies	<ul style="list-style-type: none"> <li>• Note the required trades for the week.</li> <li>• Research stocks for the required trades.</li> <li>• Make required trades by Friday at 3:00 p.m.</li> <li>• Prepare my report.</li> <li>• Check that I've followed all assignment instructions.</li> </ul>
Complete Connect homework	Tues-Sun; 30-60 min.	<ul style="list-style-type: none"> <li>• Try to complete a few problems if I don't have a lot of free time during the week.</li> </ul>

		<ul style="list-style-type: none"> <li>• Use homework as a self-test. Work problems without looking at my notes or the learning content.</li> <li>• If I get stuck, look at examples of how to do the problem. Ask for help if I need it.</li> </ul>
Complete all other assignments	Mon-Sun; time varies	<ul style="list-style-type: none"> <li>• Periodically check my list of assignments due this week and follow through with them.</li> <li>• Break assignments into smaller tasks if needed.</li> <li>• If an assignment is not going well or I'm behind schedule, what can I adjust right now to keep myself on track?</li> </ul>
Double check assignment submissions	Fri-Sun, 10-20 min.	<ul style="list-style-type: none"> <li>• Make sure that all of my assignments are complete and submitted.</li> <li>• Make a plan for finishing any remaining work that needs to be completed by Sunday.</li> </ul>
Reflect on my work for the week	Fri-Sun, 5-10 min.	<ul style="list-style-type: none"> <li>• What was my level of interest in the topics that I studied this week?</li> <li>• How do I feel about my progress?</li> <li>• Did I give myself or have enough time to complete this week's work?</li> <li>• Did I reach out for help if I got stuck on something, needed some advice, encouragement, or relief from work or personal life pressures?</li> <li>• Would I do something differently if I could start over? What would I change for next week's coursework strategy?</li> </ul>

Adapted from: Harrington, C. (2021). A Course-Embedded Study Task Planning Intervention Activity for College Students. *Journal of Instructional Pedagogies*, 26.



## Appendix E

## Data Collection Instruments, Data Analysis and Quality Considerations

Understanding Aim	Data Sources	Data Collection Strategy	Sampling Plan	Plan for data analysis	Notes on Quality
<b>RQ1) How does the course design support students' deployment of learning and study strategies related to self-testing, testing, and anxiety management with in these asynchronous, online accounting courses?</b>					
The supports and barriers to student metacognitive development.	COMM 2010 and COMM 2020 Courses	Course evaluations.	COMM 2010 and COMM 2020 courses	Review course with Quality Matters Rubric  Evaluate course to identify supports and barriers specific to Self-Testing, testing, and anxiety management.	<b>Dependability:</b> Employed a consistent coding system supported by a reflexive memo process.  <b>Data Triangulation:</b> One of two data sources addressing the question.
The supports and barriers to student metacognitive development	Course Instructor for COMM 2010 and 2020	Semi-structured interview protocol.	One course instructor for both courses.	Qualitative analysis. Code data and organize interview data into themes.	<b>Progressive Subjectivity:</b> Used semi-structured interview protocol.  <b>Dependability:</b> Employed a consistent coding system supported by a reflexive memo process.  <b>Data Triangulation:</b> One of two data sources addressing the question.
<b>RQ2) To what extent and in what way do students deploy learning and study strategies related to self-testing, testing and anxiety management in these asynchronous, online accounting courses?</b>					
The ways students are deploying study and learning	Spring COMM 2020 student participants.	LASSI Inventory (Fall COMM 2010 administration results)	Recruit of students enrolled in COMM 2020 from which to	Identify three percentile score groups: 0-50 <sup>th</sup> (low),	<b>Reliability:</b> Cronbach $\alpha$ coefficients ranging between .76 to .87 across the subscales.

Understanding Aim	Data Sources	Data Collection Strategy	Sampling Plan	Plan for data analysis	Notes on Quality
strategies to be successful in the course.			review LASSI results	51 <sup>st</sup> -75 <sup>th</sup> (medium), 76 <sup>th</sup> -100 <sup>th</sup> (high).	<p><b>Validity:</b> Construct/Content validity.</p> <p><b>Data Triangulation:</b> One of three data sources addressing the question.</p>
The ways students are deploying study and learning strategies in the course.	COMM 2020 student participants	Quantitative survey on course experience related to self-testing, test-taking, and anxiety management strategies	Provide survey to student tier groups.  Sequential explanatory design phase 1.	Descriptive statistics: quantitative analysis to assess the common themes identified by student participants.	<p><b>Validity:</b> Construct/content validity. Use themes from qualitative course review (RQ2) and literature to create survey items.</p> <p><b>Reliability:</b> Conducted pilot tests with stakeholders for feedback on survey instrument.</p> <p><b>Data Triangulation:</b> One of three data sources addressing the question.</p>
The ways students are deploying study and learning strategies to be successful in the course.	COMM 2020 student participants	Semi-structured interview protocol.	Choose students from the lowest LASSI percentile tier to interview.	Qualitative analysis. Code data and organize interview data into themes.	<p><b>Credibility:</b> Conducted follow-up interviews with COMM 2020 students from lowest tiered group. Recruited first-generation and students from historically underrepresented populations to gain further insights and clarification.</p> <p><b>Progressive Subjectivity:</b> Used semi-structured interview protocol.</p>

Understanding Aim	Data Sources	Data Collection Strategy	Sampling Plan	Plan for data analysis	Notes on Quality
					<p><b>Dependability:</b> Employed a consistent coding and data analysis system.</p> <p><b>Data Triangulation:</b> One of three data sources addressing the question.</p>
<p><b>RQ 3) What kinds of challenges do first and second-year students experience in their deployment of learning and study strategies related to self-testing, testing, and anxiety management within these asynchronous, online accounting courses?</b></p>					
<p>The challenges first and second-year students experience with developing their metacognitive learning and study skills strategies.</p>	<p>Spring COMM 2020 student participants.</p>	<p>LASSI Inventory (Fall COMM 2010 administration results).</p>	<p>Recruit of students enrolled in COMM 2020 from which to review LASSI results</p>	<p>Identify three percentile score groups: 0-50<sup>th</sup> (low), 51<sup>st</sup>-75<sup>th</sup> (medium), 76<sup>th</sup>-100<sup>th</sup> (high).</p>	<p><b>Reliability:</b> Cronbach <math>\alpha</math> coefficients ranging between .76 to .87 across the subscales.</p> <p><b>Validity:</b> Construct/Content validity.</p> <p><b>Data Triangulation:</b> One of three data sources addressing the question.</p>
<p>The challenges first and second-year students experience with developing their metacognitive, learning, and study skills strategies.</p>	<p>Spring COMM 2020 student participants</p>	<p>Quantitative survey on course experience related to Self-Testing, test-taking, and anxiety management strategies</p>	<p>Provide survey to all participants across tier groups.</p>	<p>Descriptive statistics: quantitative analysis to assess the common themes identified by student participants.</p>	<p><b>Validity:</b> Construct/content validity. Used findings from course evaluation (RQ2) and literature to create survey items.</p> <p><b>Reliability:</b> Conducted pilot tests with stakeholders for feedback on survey instrument.</p>

Understanding Aim	Data Sources	Data Collection Strategy	Sampling Plan	Plan for data analysis	Notes on Quality
					<p><b>Data Triangulation:</b> One of three data sources addressing the question.</p>
<p>The challenges first and second-year students experience with developing their learning and study skills strategies.</p>	<p>Spring COMM 2020 student participants</p>	<p>Semi-structured interview protocol.</p>	<p>Choose students from the lowest LASSI percentile tier to interview.</p>	<p>Qualitative analysis. Code data and organize interview data into themes.</p>	<p><b>Credibility:</b> Conducted follow-up interviews with COMM 2020 students from lowest tiered group. Recruited first-generation and students from historically underrepresented populations to gain further insights and clarification.</p> <p><b>Progressive Subjectivity:</b> Used semi-structured interview protocol.</p> <p><b>Dependability:</b> Employed a consistent coding system supported by a reflexive memo process.</p> <p><b>Data Triangulation:</b> One of three data sources addressing the question.</p>

## Appendix F

General Standards	Specific Review Standards	Points
<b>Course Overview and Introduction</b>	1.1 Instructions make clear how to get started and where to find various course components.	3
	1.2 Learners are introduced to the purpose and structure of the course.	3
	1.3 Communication expectations for online discussions, email, and other forms of interaction are clearly stated.	2
	1.4 Course and institutional policies with which the learner is expected to comply are clearly stated within the course, or a link to current policies is provided.	2
	1.5 Minimum technology requirements for the course are clearly stated, and information on how to obtain the technologies is provided.	2
	1.6 Computer skills and digital information literacy skills expected of the learner are clearly stated.	1
	1.7 Expectations for prerequisite knowledge in the discipline and/or any required competencies are clearly stated.	1
	1.8 The self-introduction by the instructor is professional and is available online.	1
	1.9 Learners are asked to introduce themselves to the class.	1
<b>Learning Objectives (Competencies)</b>	2.1 The course learning objectives, or course/program competencies, describe outcomes that are measurable.	3
	2.2 The module/unit-level learning objectives or competencies describe outcomes that are measurable and consistent with the course-level objectives or competencies.	3
	2.3 Learning objectives or competencies are stated clearly, are written from the learner's perspective, and are prominently located in the course.	3
	2.4 The relationship between learning objectives or competencies and learning activities is clearly stated.	3
	2.5 The learning objectives or competencies are suited to the level of the course.	3
<b>Assessment and Measurement</b>	3.1 The assessments measure the achievement of the stated learning objectives or competencies.	3
	3.2 The course grading policy is stated clearly at the beginning of the course.	3
	3.3 Specific and descriptive criteria are provided for the evaluation of learners' work, and their connection to the course grading policy is clearly explained.	3
	3.4 The assessments used are sequenced, varied, and suited to the level of the course.	2
	3.5 The course provides learners with multiple opportunities to track their learning progress with timely feedback.	2
<b>Instructional Materials</b>	4.1 The instructional materials contribute to the achievement of the stated learning objectives or competencies.	3
	4.2 The relationship between the use of instructional materials in the course and completing learning activities is clearly explained.	3
	4.3 The course models the academic integrity expected of learners by providing both source references and permissions for use of instructional materials.	2
	4.4 The instructional materials represent up-to-date theory and practice in the discipline.	2
	4.5 A variety of instructional materials is used in the course.	2
<b>Learning Activities and Learner Interaction</b>	5.1 The learning activities promote the achievement of the stated learning objectives or competencies.	3
	5.2 Learning activities provide opportunities for interaction that support active learning.	3
	5.3 The instructor's plan for interacting with learners during the course is clearly stated.	3
	5.4 The requirements for learner interaction are clearly stated.	2
<b>Course Technology</b>	6.1 The tools used in the course support the learning objectives or competencies.	3
	6.2 Course tools promote learner engagement and active learning.	3
	6.3 A variety of technology is used in the course.	1
	6.4 The course provides learners with information on protecting their data and privacy.	1
<b>Learner Support</b>	7.1 The course instructions articulate or link to a clear description of the technical support offered and how to obtain it.	3
	7.2 Course instructions articulate or link to the institution's accessibility policies and services.	3
	7.3 Course instructions articulate or link to the institution's academic support services and resources that can help learners succeed in the course.	3
	7.4 Course instructions articulate or link to the institution's student services and resources that can help learners succeed.	1
<b>Accessibility* and Usability</b>	8.1 Course navigation facilitates ease of use.	3
	8.2 The course design facilitates readability.	3
	8.3 The course provides accessible text and images in files, documents, LMS pages, and web pages to meet the needs of diverse learners.	3
	8.4 The course provides alternative means of access to multimedia content in formats that meet the needs of diverse learners.	2
	8.5 Course multimedia facilitate ease of use.	2
	8.6 Vendor accessibility statements are provided for all technologies required in the course.	2

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**Specific Review Standards from the QM Higher Education Rubric 6<sup>th</sup> Edition: COMM 2010/2020**

General Standards	Specific Review Standards		Points	Score	Notes
<b>Course Overview and Introduction</b>	1.1	Instructions make clear how to get started and where to find various course components.	3	3	Link to course overview and walk-through video w/transcript linked in the week one announcement.  Course Blackboard tour video w/transcript located in the orientation module.  “How the Course will work” with details about Smartbook reading, concept overview videos, sample problems and applications, practice problems, homework problems, prior week review content, included in the syllabus
	1.2	Learners are introduced to the purpose and structure of the course.	3	3	Included in syllabus. Link to syllabus in orientation and in course navigation menu.
	1.3	Communication expectations for online discussions, email, and other forms of interaction are clearly stated.	2	2	Communication and contact information included in course syllabus.  Link to Teams overview video, link to various Teams channels (including Administrative Course Questions), and directions about how to set up a personalized Teams experience.  Instructor email and TA email posted in several areas throughout the course.  Teams sites to connect to peers, TAs, and instructor.

General Standards	Specific Review Standards		Points	Score	Notes
					<p>Office hours link to set up appointments and instructor email included in the course orientation.</p> <p>Orientation module: 11) Learn about our Online Community. Meet and Greet, TA Office hours and cue to create peer study groups.</p>
	1.4	Course and institutional policies with which the learner is expected to comply are clearly stated with the course, or a link to current policies is provided.	2	2	Course policies, including add/drop, communication and contact information, accommodations, academic integrity and honor code, Wellbeing statement and links to student health services, inclusion and respect for differences statement, and audio/video taping and distribution of class materials included in the syllabus.
	1.5	Minimum technology requirements for the course are clearly stated, and information on how to obtain the technologies is provided.	2	2	<p>Blackboard browser checker and McGraw Hill system support checker included in course Orientation module.</p> <p>Course overview: 3) How is our course organized? Take the course tour video.</p> <p>Course orientation: 7) Connecting to McGraw Hill Connect site overview and instructions.</p> <p>Course orientation: 8) What do I need to know about e-book and supporting technology?</p>

General Standards	Specific Review Standards		Points	Score	Notes
	1.6	Computer skills and digital information literacy skills expected of the learner are clearly stated.	1	.5	Learning environment statement outlining the online asynchronous modality, and Blackboard LMS.
	1.7	Expectations for prerequisite knowledge in the discipline and/or any required competencies are clearly stated.	1	n/a	Entry level course—only basic computer skills required. *COMM 2010 is a pre-requisite for COMM 2020
	1.8	The self-introduction by the instructor is professional and is available online.	1	1	A short form for students to fill out is included in the orientation: name, email, and current program of study.
	1.9	Learners are asked to introduce themselves to the class.	1	1	Learners are encouraged to join a small group Microsoft Teams site (created in the course), and form their own peer study groups, but the large number of students in these courses makes personal introductions to the entire class unrealistic.
<b>Learning Objectives (Competencies)</b>	2.1	The course learning objectives, or course/program competencies, describe outcomes that are measurable.	3	3	<ul style="list-style-type: none"> <li>• Be able to effectively self-assess and manage your learning outcomes in this course and in future contexts.</li> <li>• Be able to recognize and evaluate a standard set of economic transactions to record and report in an accounting system.</li> <li>• Be able to prepare journal entries to record a standard set of economic transactions in the accounting system.</li> <li>• Be able to prepare and interpret financial statements to understand what underlying economic transactions are being reported.</li> <li>• Be able to apply these skills and critical thinking to new or novel economic transactions to form the basis for</li> </ul>



General Standards	Specific Review Standards		Points	Score	Notes
					determining the appropriate accounting and reporting treatments.
	2.2	The module/unit level learning objectives or competencies describe outcomes that are measurable and consistent with the course-level objectives or competencies.	3	3	Each weekly lesson begins with a description of the upcoming topics. These topics implicitly and explicitly align with the overarching course objectives.
	2.3	Learning objectives or competencies are stated clearly, are written from the learner’s perspective and are prominently located in the course.	3	3	The course objectives are listed in the syllabus. Weekly topics are located in the overview videos and transcripts but are not listed separately.
	2.4	The relationship between the learning objectives or competencies and learning activities is clearly stated.	3	3	In each weekly introductory video, the weekly topics are connected to the learning activities—i.e., reading and practice problems.
	2.5	The learning objectives or competencies are suited to the level of the course.	3	3	As an introductory level course, the learning objectives are appropriate.
<b>Assessment and Measurement</b>	3.1	The assessments measure the achievement of the stated learning objectives of competencies.	3	3	The assessments are aligned with course objectives and topics. Each assessment builds on previous content, as learners assimilate concepts that build upon on another.
	3.2	The course grading policy is stated clearly at the beginning of the course.	3	3	Course Orientation: 8) What do I need to know about taking my exams? Overview of exams and testing procedures.  Course syllabus outlines grading policy and assessment schedule.
	3.3	Specific and descriptive criteria are provided for the evaluation of learners’ work, and their connection to the course grading policy is clearly explained.	3	3	The grading process is clearly explained before and after each exam within the announcement stream.

General Standards	Specific Review Standards		Points	Score	Notes
					Course syllabus outlines grading policy and assessment schedule.
	3.4	The assessments are sequenced, varied, and suited to the level of the course.	2	1	3 midterm exams; 1 final exam—a; similar formats and delivered through the McGraw Hill Connect system.
	3.5	The course provides learners with multiple opportunities to track their learning progress with timely feedback.	2	2	<p>Smartbook reading questions available for each chapter. Adaptive technology integrates concepts within each question cycle. Program requires students to report their confidence in each answer.</p> <p>Optional Recharge tool provides quizzes over previously learned content.</p> <p>Optional Reports feature includes “most challenging learning objectives” with additional practice questions.</p> <p>Concept overview videos with optional questions available for each chapter.</p> <p>Weekly practice problems and homework problems.</p> <p>Post-exam analysis for midterm exams included in announcement stream.</p>
<b>Instructional Materials</b>	4.1	The instructional materials contribute to the stated learning objectives or competencies.	3	3	All learning activities align with course objectives and topics throughout the course.
	4.2	The relationship between the use of instructional materials in the course and completing learning activities is clearly explained.	3	3	Link to course overview and walk-through video w/transcript linked in the week one announcement.

General Standards	Specific Review Standards		Points	Score	Notes
					Can also be found in the course overview and Blackboard walk-through videos.
	4.3	The course models academic integrity expected of learners by providing both source references and permissions for use of instructional materials.	2	2	All policies regarding academic integrity/honor code and audio/video taping and distribution of class materials included in the syllabus.
	4.4	The instructional materials represent up-to-date theory and practice in the discipline.	2	2	E-Textbook copyrighted 2022. Textbook-Fundamentals of Financial Accounting, by Phillips, Clor-Proell, Libby and Libby 7 <sup>th</sup> ed. (2021).
	4.5	A variety of instructional materials is used in the course.	2	2	Overview videos, concept videos, problem practice videos, e-textbook with guided reading and questions,
<b>Learning Activities and Learner Interaction</b>	5.1	The learning activities promote the achievement of the stated learning objectives or competencies.	3	2	All learning activities are designed to assist students in mastering the content and are aligned with the course objectives and weekly topics.
	5.2	Learning activities provide opportunities for interaction that support active learning.	3	2	The asynchronous nature of the course does not lend to peer-to-peer or instructor-to-peer interaction. However, students do have the option to interact with one another through Microsoft Teams channels that are available throughout the course.
	5.3	The instructor's plan for interacting with learners during the course is clearly stated.	3	3	Interactions can occur through MS Teams, office hours, or by appointment. Included throughout course announcements, course orientation module, getting help module, office hours module, and Go to Teams link.
	5.4	The requirements for learner interaction are clearly stated.	2	2	Required learner interactions are only related to content—which is clearly stated in the course syllabus, course

General Standards	Specific Review Standards		Points	Score	Notes
					announcements, and course orientation module.
<b>Course Technology</b>	6.1	The tools used in the course support the learning objectives or competencies.	3	3	McGraw Hill connect— e-textbook and assessments. Course videos also support learning objectives and competencies and provide reinforcement and review.
	6.2	Course tools promote learner engagement and active learning.	3	3	<p>Smartbook reading questions available for each chapter. Adaptive technology integrates concepts within each question cycle. Program requires students to report their confidence in each answer.</p> <p>Weekly video includes overview of each week’s learning, concept overview videos, sample problem videos, practice and homework problems.</p> <p>Optional Recharge tool provides quizzes over previously learned content.</p> <p>Optional Reports feature includes “most challenging learning objectives” with additional practice questions.</p> <p>Concept overview videos with optional questions available for each chapter.</p> <p>Weekly practice problems and homework problems.</p> <p>Prior week review videos review and reinforce the past week’s content.</p>

General Standards	Specific Review Standards		Points	Score	Notes
	6.3	A variety of technology is used in the course	1	1	Video content, e-textbook
	6.4	The course provides learners with information on protecting their data and privacy.	1	0	Not found.
<b>Learner Support</b>	7.1	The course instructions articulate or link to a clear description of technical support offered and how to obtain it.	3	2	In Getting Help: links to Blackboard and Connect support.  Above referenced links also included in course syllabus.  No link to general technical help.
	7.2	Course instructions articulate or link to the institutions accessibility policies and services.	3	3	Accommodations and Inclusion statement included in syllabus.  SDAC accommodations announcement precede each exam (announcement stream)
	7.3	Course instructions articulate or link to the institution's academic support services and resources that can help learners succeed in the course.	3	3	The course includes a module titled "How to Learn" that includes a video about how to study and a link to the course study tips and essentials. Both items emphasize Self-Testing, distributed practice, and interleaving problems. Course also includes a "Getting Help" section to connect with TAs and/or course tutors.
	7.4	Course instructions articulate or link to the institution's student services and resources that can help students succeed.	1	1	Student Wellbeing statement and links to student services included in syllabus.  CAPS link and phone number provided after shooting (announcement stream)
<b>Accessibility and Usability*</b>	8.1	Course navigation facilitates ease of use.	3	2	The course navigation is intuitive within the Blackboard LMS. There are general

General Standards	Specific Review Standards	Points	Score	Notes	
				concerns with the ease of use within Blackboard.	
	8.2	The course design facilitates readability.	3	1.5	Screen readers are available (see below) but not specifically mentioned in the course.
	8.3	The course provides accessible text images and files, documents, LMS pages, and web pages to meet the needs of diverse learners.	3	2	In student Help Center, the Accessibility tab connects to information regarding Blackboard structure overview, HTML5 DIVs and iFrames for visually impaired learners, ARIA (Accessible Rich Internet Applications Suite), Keyboard navigation, screen readers, quick links (keyboard shortcuts), and Blackboard Alexa Skill. No direct link or instructions to access these options are included in the course.
	8.4	The course provides alternative means of access to multimedia content in formats that meet the needs of diverse learners.	2	2	Transcripts and captions included for all video content.
	8.5	Course multimedia facilitate ease of use.	2	1	Multimedia accessed through mouse clicks. Optional keyboard navigation is available but not highlighted in the course.
	8.6	Vendor accessibility statements are provided for all technologies required in the course.	2	0	Not found.

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### Appendix G

#### COMM 2010 Learning Strategies Support

<b>Course component</b> (Description)	<b>Course Location</b>	<b>Category:</b> <ul style="list-style-type: none"> <li>• Self-Testing</li> <li>• Testing</li> <li>• Anxiety Management</li> </ul>	<b>Type</b> (e.g., Interleaving, distributed practice, mindfulness)	<b>How is this support delivered?</b> (e.g., cue, prompt, supplemental materials/instruction)	<b>Fall '22</b>	<b>Spr '23</b>
Course Announcements	Announcement stream (12/5; 12/1; 11/28)	Self-Testing	Interleaving and distributed practice	Final exam suggested study schedule	X	
Course Announcements	Announcement stream (11/16)	Testing	Post-exam analysis (Exam 3)	Post-exam analysis form and office hours appointments.	X	
Course Announcements	Announcement stream (11/15)	Anxiety Management	Personal message, extra-time for assignments, and link to student health and wellness portal.	Video and written message, hyperlink to CAPS portal.	X	
Course Announcements	Announcement stream (11/14)	Anxiety Management	Personal message to students after shooting.	Shared personal phone number, provided CAPS phone number and link to CAPS portal.	X	
Course Announcements	Announcement stream (11/7)	Self-Testing	Optional Practice Exam—interleaving and distributed practice	Provided practice exam and students cued to time themselves when taking the practice exam.	X	
Course Announcements	Announcement stream (11/6; 10/31)	Self-Testing	Practice questions for exam—interleaving and distributed practice	Provided practice problems and cued students to begin practicing for exam	X	

<b>Course component</b> (Description)	<b>Course Location</b>	<b>Category:</b> <ul style="list-style-type: none"> <li>• Self-Testing</li> <li>• Testing</li> <li>• Anxiety Management</li> </ul>	<b>Type</b> (e.g., Interleaving, distributed practice, mindfulness)	<b>How is this support delivered?</b> (e.g., cue, prompt, supplemental materials/instruction)	<b>Fall '22</b>	<b>Spr '23</b>
Course Announcements	Announcement stream (10/27; 10/24)	Testing	Post-exam analysis (Exam 2)	Post-exam analysis form and office hours appointments.	X	
Course Announcements	Announcement stream (10/27; 10/24)	Testing	Post-exam analysis (Exam 1)	Post-exam analysis form and office hours appointments.	X	
Course Announcements	Announcement stream (9/15; 9/12)	Self-Testing	Practice questions for exam—interleaving and distributed practice	Provided practice problems and cued students to begin practicing for exam	X	
Course Announcements	Announcement stream (9/15)	Testing	Exam question forum moderated by TAs	Link to Microsoft Teams site	X	
Course Orientation Module	6. Questions to classmates, TAs, or Professor	Testing	Content questions/exam prep	Teams sites login and channel descriptions	X	
Course Orientation Module	9. What do I need to know about the e-book and supporting technology?	Self-Testing	Video	Link to overview video that refers to Smartbook features included below: Recharge and Reports	X	X
Course Orientation Module	10. What do I need to know to be a successful as an online student	Self-Testing	Study tip and essentials: Summarize key points of each lesson.	Cue to summarize each weekly lesson in their own works to create a personalized test study guide.	X	X
Course Orientation Module	10. What do I need to know to	Self-Testing	Interleaving Distributed Practice	Tips from Prior Students—Using study attempt after homework is due to re-work past problems	X	X



Course component (Description)	Course Location	Category: <ul style="list-style-type: none"> <li>Self-Testing</li> <li>Testing</li> <li>Anxiety Management</li> </ul>	Type (e.g., Interleaving, distributed practice, mindfulness)	How is this support delivered? (e.g., cue, prompt, supplemental materials/instruction)	Fall '22	Spr '23
	be a successful as an online student					
How to Learn Module	Video: Pro-tips How to Study.	Self-Testing	Interleaving Distributed Practice	Through a 5-minute overview and summary	X	X
How to Learn Module	Resource: Teach Yourself How to Learn	Self-Testing Anxiety Management	Distributed Practice Practice tests Deep breathing and positive self-talk	Link to e-book from the UVA library. McGuire, S. Y. (2018). <i>Teach yourself how to learn: Strategies you can use to ace any course at any level</i> . Stylus Publishing. Testing, Self-Testing and Anxiety Management addressed in chapter 9.		X
How to Learn Module	Test Anxiety Resources	Anxiety Management	Mindfulness	Link to <i>The Mindful College Student</i> website that provides free mindfulness resources.		X
Course content modules	Smartbook: Recharge tool	Self-Testing	Interleaving Distributed Practice	The Recharge tool provides students with quizzes over previously learned content. Students select chapters they wish to review, and the program presents questions about the concepts they found more difficult or would be likely to forget.	X	X
Course content modules	Smartbook: Reports feature	Self-Testing	Report (calibration)	Topic Scores, Missed Questions, and the Most Challenging Learning Objectives display students' most challenging content and provide additional concept mastery opportunities	X	X
Course content modules	Smartbook: Reports feature, practice quiz	Self-Testing	Practice quiz	Practice quizzes allow students to choose specific content to review and select the number of questions in a custom targeted practice quiz.	X	X

<b>Course component</b> (Description)	<b>Course Location</b>	<b>Category:</b> <ul style="list-style-type: none"> <li>• Self-Testing</li> <li>• Testing</li> <li>• Anxiety Management</li> </ul>	<b>Type</b> (e.g., Interleaving, distributed practice, mindfulness)	<b>How is this support delivered?</b> (e.g., cue, prompt, supplemental materials/instruction)	<b>Fall '22</b>	<b>Spr '23</b>
Course content modules	Smartbook: Reports feature, self-assessment	Self-Testing	Report (calibration)	The Self-Assessment option presents students with their self-reported concept mastery confidence levels. Three student data points: 1) concepts they were aware they knew the answer (higher-level calibration), 2) concepts they were unaware they knew the answer (lower-level calibration), and 3) concepts they were unaware they didn't know the answer (lower-level calibration).	X	X

## Appendix H

### COMM 2010/20 Instructor Semi-Structured Interview Protocol

#### Introduction

Thank you for meeting with me today. As you know, I am conducting a research study to understand COMM 2010 student experiences as they relate to Self-Testing, test taking and anxiety management metacognitive strategies. The purpose of this interview is to understand the supports and barriers to these strategies in these courses as well as your instructional philosophy. I anticipate that we will talk for about 30-45 minutes.

#### Consent

May I have your permission to record this meeting?

#### Interview Questions

1. How do you assist students in connecting new knowledge with their previous knowledge in as they learn?
2. How do you help students to prepare for exams?
3. What types of study materials do you provide for exams? What do these materials include?
4. What types of questions do you include on exams?
5. How do you support individual students' needs?
6. What supports do you offer students who suffer from test anxiety?
7. In what ways do you see this course could be improved to support students' use of strategies for Self-Testing? Testing? Anxiety management?

## Appendix I

## COMM 2010/2020 Instructor Interview Codebook

Category	Type	Code	Definition	Example
Design	Testing	TSTD	Test Design—the intentional procedure for designing tests to ensure reliability, validity, and academic integrity.	So, honor is so important and so I do that obviously through the inclusion of designing assessment. With that in mind, the emphasis of the honor pledge on all assignments. And then in fact, I have a guest speaker coming to talk about ethics in accounting and how it ties not just if you're going into a career in accounting, but also in your academic career and then into any professional career that you're going into.
Design	Anxiety	DANX	Design of the course can contribute to student anxiety	That's when the anxiety kicked in and that's the hard ones and it's like what... I don't know what to do. So I do offer... I do tell them about CAPS, I refer them to that. A lot of them that are on open and honest about the anxiety are already receiving some sort of therapy, and they'll share that with me and they'll say, "I'm going to talk to my therapist about that," which I think is great. Some students that I refer them to thinking about getting outside help for anxiety, they'll say they come from a family that doesn't believe in therapy but they're open to it. So that's been very... I haven't talked to one student who was.
Coaching/ Prompting	Testing- interleaving	CPTI	Directs students to prepare for tests by studying a variety of problems from current or past chapters	So I was explaining how you get those stronger connections in your brain when you don't just go in a chronological order with content. When you're mixing up what you're studying. We also... I talked with a student yesterday about not waiting till Saturday to spend five hours. Try to book an hour each day. And she was like, "Oh well that's what I've been doing. I've been doing all my studying on Saturday and Sundays." So things like that. So I was using this as a guide and pointing out, look at some of the key features here.

Category	Type	Code	Definition	Example
Coaching/ Prompting	Testing- Distributed practice	CPDP	Directs students to study for upcoming exams in sequenced intervals.	Yeah. I felt like... I was going to put it in this main document and then I felt like I don't think every student needed this. And I also didn't want every student to think, "Oh, if I follow this, I'm going to pass the final exam." But as I meet individually with students, I felt like some could really benefit from just some structure. So I shared this with them and said, "You need to customize this obviously with your own timeline and then with what you identify as the units that you need more practice with." I highlighted to them, "After you watch this video, you're going to see that you want to mix up your studying. So notice how for Monday, I said do your SmartBook for unit one, but then do the unit four demo cases."
Coaching/ Prompting	Self-Testing	CPST	Directs students to use different Self-Testing strategies depending on context or complexity, e.g., summarizing, creating a concept map, self-explanations, or mnemonic techniques,	Yeah. I felt like... I was going to put it in this main document and then I felt like I don't think every student needed this. And I also didn't want every student to think, "Oh, if I follow this, I'm going to pass the final exam." But as I meet individually with students, I felt like some could really benefit from just some structure. So I shared this with them and said, "You need to customize this obviously with your own timeline and then with what you identify as the units that you need more practice with." I highlighted to them, "After you watch this video, you're going to see that you want to mix up you're studying. So notice how for Monday, I said do your SmartBook for unit one, but then do the unit four demo cases."
Coaching/ Prompting	Anxiety Management	CPAM	Directs students to use anxiety management techniques.	So whether they have emailed me... Usually if they email me and I get this sense of this is a anxiety issue, I do ask them to set up an appointment with me, because I think that it is just easier to talk through it. Most of them are... They're willing to talk about it. When I start asking them what's going on, they tell me everything they've done. I ask them, "Okay, what did you do to prepare?" And sometimes I know based on what

Category	Type	Code	Definition	Example
				<p>they've done to prepare, that the anxiety contributed to their poor performance but also their preparation wasn't maybe the best approach. So I try to figure that out first. But the ones that are the hardest are the ones that tell me that all the things they've done and everything sounds correct, and then they get on the exam and they don't... What happened? So whether they have emailed me... Usually if they email me and I get this sense of this is an anxiety issue, I do ask them to set up an appointment with me, because I think that it is just easier to talk through it. Most of them are... They're willing to talk about it. When I start asking them what's going on, they tell me everything they've done. I ask them, "Okay, what did you do to prepare?" And sometimes I know based on what they've done to prepare, that the anxiety contributed to their poor performance but also their preparation wasn't maybe the best approach. So I try to figure that out first. But the ones that are the hardest are the ones that tell me that all the things they've done and everything sounds correct, and then they get on the exam and they don't... What happened?</p>
Coaching/ Prompting	Anxiety Management	CPSC	Advises students to practice self-care. Directs serious mental health concerns to CAPS.	<p>That's when the anxiety kicked in and that's the hard ones and it's like what... I don't know what to do. So I do offer... I do tell them about CAPS, I refer them to that. A lot of them that are on open and honest about the anxiety are already receiving some sort of therapy, and they'll share that with me and they'll say, "I'm going to talk to my therapist about that," which I think is great. Some students that I refer them to thinking about getting outside help for anxiety, they'll say they come from a family that doesn't believe in therapy but they're open to it. So that's been very... I haven't talked to one student who was</p>

Category	Type	Code	Definition	Example
Learning Materials	Anxiety Management	LMAM	Provides students with clear assessment criteria and problem exemplars prior to each test.	FOUND IN COURSE MATERIALS
Learning Materials	Metacognitive Development	LMMD	Provides a repository of readings, videos, and other resources about how to succeed in the course	So I share with them that I work with you, I work with an instructional designer, we've talked about this. We have this one resource, we're looking for more, but in the meantime this might be something, and so I do share that with them. Then I try to give them some technique leading up to the next exam or things to do on the exam. And a document that has helped me with that, is I created this post exam analysis document, where preparing for the exam, what did they do? And I list a bunch of studying activities and I asked them to break out their time. I can share it with you.

## Appendix J

### COMM 2020 Initial Recruitment Email and Informed Consent

Dear [STUDENT NAME],

My name is Gabrielle Griffin, and I am an Instructional Designer at the McIntire School. I'm also a doctoral candidate conducting a research study at the UVA School of Education and Human Development. This study is an investigation into students' experiences while enrolled in the COMM 2010 course. Specifically, I am interested in examining your experiences with Self-Testing, testing, and anxiety.

In COMM 2010 last fall, you completed the Learning and Study Strategies Inventory (LASSI). I am asking your permission to review and report on your category scores in Self-Testing, Testing Strategies, and Anxiety. I will keep your scores confidential, and no identifying information will be included in the study. Also, I will not review or report on any other category scores than the ones referenced above.

I will also ask you to complete a brief 10-minute online survey that will ask you questions about your experiences with Self-Testing, testing, and anxiety in COMM 2010. When completing the survey, you can skip any question that makes you uncomfortable. I will keep your survey answers confidential and anyone reading the study will not be able to identify you.

I do hope you agree to participate in this study because the results will hopefully inform me how to best support future COMM 2010 and COMM 2020 students. If you decide to participate, please read, sign, and return the attached electronic consent form.

If you have any questions or want further information about this research study or survey, please contact me at gag5zc@virginia.edu. Thank you for your participation!

Take care,



Gabrielle Griffin, Instructional Designer  
McIntire School of Commerce  
University of Virginia

UVA IRB-SBS #4640  
(Consent Form Attached)



## Informed Consent Agreement

**Study Title:** Understanding Undergraduates' Deployment of Metacognitive Strategies

**Protocol #:** 4640

**Purpose of the research study:** The purpose of the study is to understand how undergraduate students deployed learning strategies related to Self-Testing, test-taking, and anxiety management in an asynchronous online introductory accounting course.

**What you will do in the study:** You will grant permission for the researcher to review and report your Learning and Study Strategies Inventory (LASSI) scores in the Self-Testing, Test Strategies, and Anxiety categories. These scores will be from the fall 2022 LASSI while enrolled in the COMM 2010 course. Please note that the researcher will not review any more LASSI category scores other than the ones referenced above.

You will complete a brief online survey related to your experiences with Self-Testing, test strategies, and anxiety in the COMM 2010 course. When completing the survey, you can skip any question that makes you uncomfortable.

**Time required:** The survey will require about 10 minutes of your time.

**Risks:** There are no anticipated risks in this study.

**Benefits:** There are no direct benefits to you for participating in this research study. There are no direct benefits to you for participating in this research study. The study may help us understand how to support online students in future iterations of these courses.

**Confidentiality:** The information that you give in the study will be handled confidentially. Your information will be assigned a code number. The list connecting your name to this code will be kept in a locked file. When the study is completed and the data have been analyzed, this list will be destroyed. Your name will not be used in any report, and data will be presented in an aggregated format.

**Voluntary participation:** Your participation in the study is completely voluntary. Your decision to participate will have no effect on grades or school services.

**Right to withdraw from the study:** You have the right to withdraw from the study at any time without penalty.

**How to withdraw from the study** If you want to withdraw from the study, notify the researcher that you do not want your LASSI scores and survey data included in the study. There is no penalty for withdrawing and withdrawing will not affect your grades or school services.

**Payment:** You will receive no payment for participating in the study.

**Using data beyond this study:** Your data will be used beyond this study and will be destroyed within one year after the conclusion of this study.

**If you have questions about the study, contact:**

Gabrielle Griffin  
Curriculum, Instruction, and Special Education  
University of Virginia, Charlottesville, VA 22903.  
Telephone: (540) 841-0175  
[gag5zc@virginia.edu](mailto:gag5zc@virginia.edu)

Dr. Jennifer Chiu  
Curriculum, Instruction, and Special Education, PO Box 400273  
University of Virginia, Charlottesville, VA 22903.  
Telephone: (434) 924-3915  
[jlchiu@virginia.edu](mailto:jlchiu@virginia.edu)

**To obtain more information about the study, ask questions about the research procedures, express concerns about your participation, or report illness, injury or other problems, please contact:**

Tonya R. Moon, Ph.D.  
Chair, Institutional Review Board for the Social and Behavioral Sciences  
One Morton Dr Suite 400  
University of Virginia, P.O. Box 800392  
Charlottesville, VA 22908-0392  
Telephone: (434) 924-5999  
Email: [irbsbshelp@virginia.edu](mailto:irbsbshelp@virginia.edu)  
Website: <https://research.virginia.edu/irb-sbs>  
Website for Research Participants: <https://research.virginia.edu/research-participants>  
UVA IRB-SBS #4640

I am 18 years old or older.

**Electronic Signature Agreement:**

I agree to provide an electronic signature to document my consent.

**E-SIGNATURE BOX HERE**

**Study Agreement:**

I agree to participate in the research study described above.

**E-SIGNATURE BOX HERE**

**You may print a copy of this consent for your records.**

## Appendix K

### COMM 2010/20 Learning Strategies Survey Questions

**Directions:** Thank you for sharing about your experience in COMM 2010. Your participation in this survey is entirely voluntary, and your decision to participate will not affect your course grade. If you feel uncomfortable with a question, you may skip it, or, you can opt-out of the survey at any time. There are no right or wrong answers to these questions, but we ask you to be open and honest in your responses. It will probably take you about 5-7 minutes to complete this survey.

**Note:** The following Likert-type question response options include *Not very typical of me*, *Somewhat typical of me*, *Fairly typical of me*.

- **Not very typical of me**, means that the statement is generally not true about you.
- **Somewhat typical of me**, means that the statement is true about half of the time.
- **Fairly typical of me** means the statement is generally true of you.

#### Self-Testing

##### In COMM 2010...

1. I actively tried to connect new accounting concepts with things I already knew.
2. As I read the course e-book, I routinely stopped and asked myself, "Does this make sense?"
3. As I learned difficult accounting **concepts**, I explained them in my own words.
4. As I worked through accounting **problems**, I verbalized each step.
5. I wrote down the main ideas of each weekly lesson.
6. I utilized the Smartbook Recharge Quiz option.
7. I utilized the Smartbook Practice Quiz option (accessed through Smartbook Reports).

#### Testing strategies (Brown et al., 2017; Rozakis, 2003)

##### In COMM 2010...

8. I reviewed my previous notes before starting a new chapter.
9. I studied each day for several days before each course exam.
10. When I solved accounting problems on exams, I re-checked my computations for each step.
11. When working through multiple-choice items, I first eliminated wrong answers before selecting the correct answer.
12. After I received my corrected test, I tried to understand what I did wrong.
13. To prepare for an upcoming exam, I routinely (check all that apply).
  - skimmed the textbook chapters.

- thoroughly read the textbook chapters.
- reviewed my own notes.
- reviewed Prof. Martin’s problem walk through videos on Blackboard.
- re-did the connect chapter practice questions and homework in “study attempt” mode.
- worked on current practice exam questions.
- worked on previous practice exam questions.
- posted questions on Teams or worked with a study group.
- met with a course TA.
- completed the end-of-chapter demo cases.

**Anxiety** (Naveh-Benjamin, 1991; Naveh-Benjamin et al., 1987)

**In COMM 2010...**

- 14.** I experienced symptoms of anxiety while I was in COMM 2010 (e.g. stress, fear, helplessness, negative/racing thoughts, or difficulty concentrating).
- If yes--I would experience symptoms of anxiety when: (free response)
  - If yes--I experienced anxiety in the course, I could effectively manage my symptoms.
  - If yes—I actively sought help for my anxiety while I was in the course.
    - If yes—While in this course, I sought help for my anxiety from: (free response)
- 15.** While you were in COMM 2010, did you ever personally connect with the instructor?
- If yes—Why did you connect with the instructor?
  - If no—Why didn’t you connect with the instructor?

**Demographics**

- 16.** What is your current year?
- 1<sup>st</sup>
  - 2<sup>nd</sup>
  - 3<sup>rd</sup>
  - 4<sup>th</sup>
- 17.** What is your gender identity?
- Female
  - Male
  - Non-Binary
  - Prefer to self-describe
    - Self-describe:
- 18.** Which race or ethnicity best describes you? (Please choose only one.)
- American Indian or Alaskan Native
  - Asian / Pacific Islander

- Black or African American
  - Hispanic
  - White / Caucasian
  - Multiple ethnicities / Other (please specify)
    - Specify
- 19.** Are you a first-generation college student?
- a) Yes
  - b) No
- 20.** Would you be willing to participate in a short, follow-up interview?
- a) Yes
  - b) No
- 21.** If yes, what is your name and your UVA computing ID?
- Name:
  - Computing ID:

## Appendix L

### COMM 2020 Interview Recruitment Email and Informed Consent Agreement

Dear [STUDENT NAME],

I hope this email finds you well. First, I wanted to thank you for participating in my research study, and I'm reaching out to see if you would be willing to participate in a follow-up interview with me.

During the interview, I will ask you some more questions about your experience in COMM 2010, as well as how the course aligns with your future academic and career goals. We will meet through Zoom, and our discussion will take about 15-20 minutes. Of course, you are under no obligation to participate and choosing to accept or decline my invitation will not affect your standing in COMM 2020.

I do hope you agree to an interview, because your insights will help me better understand how to support future COMM 2010 and COMM 2020 students. Also, please know that I will keep your name confidential, and anyone reading the study will not be able to identify you.

To set up an interview, please schedule an appointment using the link below. Once you have chosen a time, I will send you an Outlook calendar invite and an interview consent form for your review and signature.

#### Schedule and Interview time (Calendly)

If you don't see a time that works for you, please let me know and I will try to find another time we could meet. Also, if you have any questions or want further information about the research study or interview, please contact me at gag5zc@virginia.edu.

Take care,



Gabrielle Griffin, Instructional Designer  
McIntire School of Commerce  
University of Virginia

UVA IRB-SBS #4640  
(Consent Form Attached)

## Informed Consent Agreement

**Study Title:** Understanding Undergraduates' Deployment of Metacognitive Strategies

**Protocol #:** 4640

**Purpose of the research study:** The purpose of the study is to understand how undergraduate students deployed learning strategies related to Self-Testing, test-taking, and anxiety management in an asynchronous online introductory accounting course.

**What you will do in the study:** You will participate in a confidential interview. Interviews will be conducted and recorded through Zoom. If you feel uncomfortable at any point, you may skip any questions on the survey and you may stop the interview at any time.

**Time required:** The interview will require about 30 minutes of your time.

**Risks:** There are no anticipated risks in this study.

**Benefits:** There are no direct benefits to you for participating in this research study. There are no direct benefits to you for participating in this research study. The study may help us understand how to support online students in future iterations of these courses

**Confidentiality:** Your interview information will be handled confidentially and you will be assigned a code number. The list connecting your name to this code will be kept in a locked file. When the study is completed, and the data have been analyzed, this list will be destroyed. Your name will not be used in any report. Video files will only be collected for this study and will be stored in the UVA BOX until the study is completed. All video recordings will be destroyed when the study is completed.

**Voluntary participation:** Your participation in the study is completely voluntary. Your decision to participate will have no effect on grades or school services.

**Right to withdraw from the study:** You have the right to withdraw from the study at any time without penalty. Your interview recording will be destroyed if you decide to withdraw from the study.

**How to withdraw from the study:** If you want to withdraw from the study you can tell the researcher to stop the interview. There is no penalty for withdrawing, and withdrawing will not affect your grades or school services.

**Payment:** You will receive no payment for participating in the study.

**Using data beyond this study:** Your data will be used beyond this study and will be destroyed within one year after the conclusion of this study.

**If you have questions about the study, contact:**

Gabrielle Griffin

Curriculum, Instruction, and Special Education

University of Virginia, Charlottesville, VA 22903.

Telephone: (540) 841-0175  
[gag5zc@virginia.edu](mailto:gag5zc@virginia.edu)

Dr. Jennifer Chiu  
Curriculum, Instruction, and Special Education, PO Box 400273  
University of Virginia, Charlottesville, VA 22903.  
Telephone: (434) 924-3915  
[jlchiu@virginia.edu](mailto:jlchiu@virginia.edu)

**To obtain more information about the study, ask questions about the research procedures, express concerns about your participation, or report illness, injury or other problems, please contact:**

Tonya R. Moon, Ph.D.  
Chair, Institutional Review Board for the Social and Behavioral Sciences  
One Morton Dr Suite 400  
University of Virginia, P.O. Box 800392  
Charlottesville, VA 22908-0392  
Telephone: (434) 924-5999  
Email: [irbsbshelp@virginia.edu](mailto:irbsbshelp@virginia.edu)  
Website: <https://research.virginia.edu/irb-sbs>  
Website for Research Participants: <https://research.virginia.edu/research-participants>  
UVA IRB-SBS # 4640

**Electronic Signature Agreement:**

I agree to provide an electronic signature to document my consent.

**E-SIGNATURE BOX HERE**

**Study Agreement:**

I agree to participate in the research study described above.

**E-SIGNATURE BOX HERE**

**You may print a copy of this consent for your records.**



## Appendix M

### COMM 2010/20 Semi-Structured Interview Protocol

#### Introduction

Thank you for meeting with me today. I am a doctoral candidate at the School of Education and Human Development, and this research is to fulfill the requirements for my final Capstone project. The purpose of this interview is to gain deeper understanding of your experiences in COMM 2010. I anticipate that we will talk for about 20-30 minutes.

There are no right or wrong answers to the questions that I will ask. My goal is to understand your personal experience, so I ask that you answer each question honestly. I will protect your anonymity by removing identifiers when I report my findings. Please understand that since this is an approved study, I may use your answers for subsequent research.

#### Consent

May I have your permission to record this meeting?

#### Questions

1. Could you explain your weekly process for working on this course?
2. Could you describe your study habits before you enrolled in this course?
3. How did this course change the way you studied?
4. What did you do when you didn't understand something in the course?
5. How did you study and prepare for tests in the course?
6. Did the course material (accounting) interest you? Why or Why not?
7. How did course design or delivery help you learn the material?
8. What would you change about the course?
9. Did your experience in the course change your plans about attending the McIntire School?
  - a. If yes, please explain.
10. If you attend McIntire, which concentration most interests you?

## Appendix N

## COMM 2020 Participant Interview Codebook

Category	Type	Code	Definition	Example
Metacognition	Learning and study methods	CKS	Conditional knowledge when studying certain subjects; uses different techniques depending on subject and content type	Oh, it's dependent on each class. Some classes, I would like more read over my notes, and then kind of like, try to see whether there were any areas that I was kind of iffy about, and then would kind of like, go over that content, maybe study with a friend, use Quizlet, test each other. And then if it was something kind of more quantitative like math, I would just do practice problems and things like that. Which was easier to go about it at least because I was like, oh, I need to like, do these problems. This is where I'm struggling. Let's see if I get them. Right. If I get them, right, I'm good to go. If I'm not. Right, more needs to be developed.
		NRM	Student indicated they did not revise their study methods as a result of the course.	No, not really, I would just review my notes. I would say like a big thing for me was, that was something I struggled with when I came into college because I didn't really have to study in high school. And I didn't come from like a big NoVa school or anything. So it wasn't like I was taking a ton of like, super difficult classes. But I would say I definitely just was taking notes and stuff and then reviewing that. And, you know, same with practice problems, like if there are practice problems available, I'll do that. For any tests, like math tests, or anything those same same for COMM.
		RM	Revised study method after taking COMM 2010 course.	Yeah, I feel like I implemented a lot of changes in during comm 2010 Like more towards the end, like for the final like I was putting in practice lots of different, like methods. And I feel like since the end of comm 2010. I've been using those same methods and I feel like it's working much better than when I first started the course.
		TMC	Time management challenges in COMM 2010	But those first couple of weeks, definitely struggled with, like time management and figuring out, like, how, how much to do when when to start reading the chapter doing the practice problems, but then, after a couple weeks, kind of got in the rhythm of it kind and figured out like how much I need to do each day
	Goal Orientation	ECON	Respondent plans to pursue Economics	
		FIN	Respondent plans to pursue Finance	

		IT	Respondent plans to pursue IT	
		MGMT	Respondent plans to pursue Management	
		MKTG	Respondent plans to pursue Marketing	
<b>Anxiety</b>	<b>Knowledge</b>	ANX	Student reports experiencing general anxiety	
		ANXK	Anxiety from not being confident in knowing content	I think I was anxious because a lot of the time, I wasn't completely confident that I knew how to solve problems.
	<b>Testing</b>	ANXT	Student indicated general testing anxiety	I think I was anxious because a lot of the time, I wasn't completely confident that I knew how to solve problems.
		ANXTT	Anxiety from timed tests	Yeah, and it's also that this is a [comm school] prereq. And that like, quadruples the pressure on any student that's taking it because not only like, do you have to do good like, just for your GPA but like, [comm school], which is for a lot of students like, like me, I didn't come in being like, [comm school, comm school]. I like took a bunch of other classes. And I was like, hey, like low key like, I can incorporate all of these into [comm school]. So I was like, Okay, I want to give it a chance. But I know some students that were like, This is it like this is the end all be all also, like for them? I can imagine the pressure was significantly more intense because they needed this class, and they don't have a plan B or anything.
	<b>Grades/ Prerequisite Course</b>	GRD	Student indicates dissatisfaction with grade in course.	I think I was anxious because a lot of the time, I wasn't completely confident that I knew how to solve problems.
	<b>Other</b>	HANX	Student reported seeking help for anxiety	Yes, I did. I did before the course I started seeing therapists in like, June, but that I also started seeing a psychiatrist this semester. And so I'd have sought help for my anxiety, especially this semester. But that was kind of before the course started. But that was a big issue this past semester. Just like worrying about it and like accepting the fact that maybe I wasn't so great at accounting. But that's fine,

		PRERQ	Student indicates anxiety from the high-stakes nature of this school prerequisite	Yeah, and it's also that this is a [comm school] prereq. And that like, quadruples the pressure on any student that's taking it because not only like, do you have to do good like, just for your GPA but like, [comm school], which is for a lot of students like, like me, I didn't come in being like, [comm school, comm school]. I like took a bunch of other classes. And I was like, hey, like low key like, I can incorporate all of these into [comm school] So I was like, Okay, I want to give it a chance. But I know some students that were like, This is it like this is the end all be all also, like for them? I can imagine the pressure was significantly more intense because they needed this class, and they don't have a plan B or anything.
Course	Course Content	NACCT	Indicates dislike of accounting subject	Honestly, no, I thought I found it really robotic. I understand. It's important. And it's probably like, supplement work. Like supplementary to some of the things I want to do in the future. But I can't like be an accountant. It was really like, I'm actually I'm literally outside like our art museum right now. Because I was in there for one of my arts classes. I need like some sort of, like, creative aspect of my life. And accounting just doesn't, doesn't, it's important, but it really doesn't provide that because like, I have like nightmares about it. Like if one number is off your accounts are not balanced. And it's you're actually done for at the point.
		PP	Uses practice problems to study	and like the practice tests were definitely very similar to what actual exams were like.
		PRV	Student reported using problem walk-through videos.	and like the practice tests were definitely very similar to what actual exams were like.
		RCS	Student indicated course provided ample resources to learn material.	In terms of like, the course materials themselves, there were a lot in addition to, you know, what to do the practice the homework, the Smartbook questions, there were a lot of like, they were supplementary.
		TREV	Student indicates that review sheets before tests were helpful	So, sometimes like, and we had review sheets, which were super helpful, but it's like, not having that guiding hand, so to speak for me, definitely made me just like, get really worried before the test. So, sometimes like, and we had review sheets, which were super helpful, but it's like, not having that guiding hand, so to speak for me, definitely made me just like, get really worried before the test.
	Course Design	ASync	Student reports first experience with online asynchronous course	A little, because it was all asynchronous. And I'd never taken like, obviously, we all kind of went through COVID and homeschooling in a way online schooling. But I had never taken a course that was meant to be all online. And so initially, I didn't really know how to approach it.

		CON	Student indicates they were unaware of existing content	But the like, at least for me, maybe I just missed it like the Tuesday night review sessions. I never saw recording for them. But that could have just been using the link?
	<b>Course Delivery</b>	FLX	Student reports enjoying the flexibility of the course	But I do like, like the flexibility of like, going, being able to like go back to my assignments and that sort of thing. And just like having everything like set up by myself.
		INS	Student indicates satisfaction with the instructor	So like, she's very helpful and just like, calming nerves, and like, being a support system. I just think for me personally, and I know for a couple of my friends, like, we learn best, like, in, in the environment.
		LCT	Student indicates their desire for a lecture-based course.	I would say one thing that I would change is kind of the thing that I mentioned with having more of like a lecture type feel, kind of I know, there are some other like CS classes here, where they'll record the lecture, and they'll have it like on a website. So you can kind of go back through and like rewatch the lectures, which is kind of nice. So I feel like something like that might be helpful. And then maybe
		OH	Student indicates need for more office hours	So I think like more in person Office Hours but I know there were some but they weren't, they didn't like work for me. So I usually stuck with like, online. And then like lectures, because it gives you a chance to like bounce off of the people around you or just hear them talking sometimes seeing them do it like live.
		SREV	Student indicates the need for multiple review sessions	So that and definitely like the review sessions, one of my friend had, she went to like every single one of them. And she said that they really helped her in preparing for the test. But like, again, I couldn't go to any of them because it was during my biolabs, so like maybe having a recording of the review sessions or maybe like just alternate, because like you can't fit everybody's schedule, and I totally am aware of that. But like maybe having like, multiple review sessions or having a recording of them if that makes sense.
		<b>Transactional distance</b>	GRP	Student reports using smaller groups within the large course.
	HS		Student identifies source of help-seeking	And then if I still couldn't figure it out, I would probably go to office hours. And ask there.

		MSTMS	Student indicates satisfaction with MS Teams	But I think Microsoft Teams is like a pretty decent alternative to that.
		NHS	Hesitant to seek help or did not seek help	No, I haven't. I'm bad about that. I haven't, like done anything like that at UVA, or specifically in this class or otherwise. I know, it would be good. And I know it would help me but I just never really gotten around to it. But I do have friends like in the class who have I have asked for help and explaining certain things.
		TD	Reports feeling alone and "on own" in the asynchronous model, or not feeling connected to the instructor, i.e., transactional distance.	specifically, but definitely, I'm making more of an effort to like attend office hours and like optional things, even if I don't have question just because it is like mostly a self-taught class. Like, well, there is like support from Professor Mitchell. It's definitely a little bit more the workload is on you.
	Tests	PCR	Student indicates need for partial credit for exam problems.	Yeah, that class would be like in person as well, which I think would be actually, um, that kind of reminds me for one thing that I would change. Like, I feel like the biggest thing I would change is, if there was a way to give partial credit on exams, because I know um, the way that it's structured is that you kind of it's kind of like the homework and practice problems where you like fill in the answer in the little section and then you keep going through the exam. But like, a lot of the questions would be multi step questions. And so if you kind of messed up one part, you couldn't show your work or anything like that, the way you would in an in-person class, especially something so quantitative is accounting. And so I know like, there were a few times where I kind of had 95% of it correct. And then made one mistake and kind of 10 points off, like the whole questions wrong. And so like, if there was a way to upload our work, or like, show or work or get some sort of partial credit, um, feel like that would be absolutely.
		TPB	Student indicates that practice problems are not as robust or complicated as test problems	But maybe like more problems that are geared towards the way the exams are structured, because our like practice and homework problems are, are a little bit like, actually quite more straight way more straightforward than like our exam. problems would be and we get like, practice for that as well. And I get the whole like, building up to that starting off simple and then getting more complicated. But maybe like a little bit more of a bridge between the way questions are now.

## Appendix O

### Data Management Plan

#### Data types and storage

The types of data generated and used in this study will be course experience surveys and semi-structured interviews. I will collect and store survey data with university's Qualtrics platform and Box secure data storage. I will collect interview data by conducting a recorded Zoom meeting with each participant. I will save each interview on my university One Drive.

#### *Data organization and storage*

I will create a password-protected folder in One Drive. The naming convention included the source ID, source information, data type, date, and data collector. Below are samples of the file naming convention I will use:

Interview recording: 01\_Interview\_video\_2.1.23

Interview transcript: 01\_Interview\_transcript\_2.1.23

I will organize data using a nested file system within the password-protected folders on One Drive. I structured the system as follows:

- Survey data
  - Survey results
  - Data analysis (Excel spreadsheets)
- Interview data
  - Interview video recording
  - Interview transcript original
  - Interview transcript with pseudonyms
- Data Analysis
  - Coded Interviews
  - Project codebook

***Data access and intellectual property***

I will keep data files secure on the university's OneDrive and store passwords in Last Pass. I will assign interview participants pseudonyms to protect their privacy and maintain confidentiality. During the transcription process, I will create a separate transcript that displays the participants' pseudonyms instead of their actual names. As an added layer of protection, the individual files of video recordings and original transcripts will be password protected.

***Data sharing and reuse***

This study has IRB authorization. I do not plan to share data collected in this study, but I may refer to these data in future research. I will communicate with study participants that their data may be used in future research, and I will secure their permission to do so.

***Data preservation and archiving***

I will preserve these data for three years, and after three years I will destroy them entirely. The file formats will be in Microsoft Office Word and Excel which have demonstrated longevity and stability.



## Appendix P

## Study Tips and Essentials

COMM 2010

## Overview

Any online course is challenging – because you must learn to hold yourself accountable for your progress and make productive use of your time. This online course replaces the “coaching” that occurs in traditional classrooms with a variety of tools and strategies. In this guide, we will suggest study tips and tools to prepare you to succeed.

## Weekly Plan of Attack

- Plan to spend **10-12** hours on each chapter every week
- Create a study routine that doesn't allow you to procrastinate
- Pace yourself – start early in the week, and allocate time in **short blocks** throughout the week
- Follow the steps outlined on this guide for optimal study performance

## Need Help?

- Attend office hours with TAs
- Watch hint videos and videos of Professors Mitchell and Martin working problems
- Post on Teams and review posts from others
- Form a Study Group with peers
- Revisit Smartbook resources
- Attend Prior Week Review Session the following week (held Monday evenings)

## Suggested Pacing for Each Week

Assignments are due Tuesday (following exam weeks), Thursday, and Sunday

M	Tu	W	Th*	F	S	S*
Watch Intro Video	View Concept Videos	Continue Practice Problems	SUBMIT SmartBook	Start Homework Problems	Continue Homework Problems	SUBMIT Practice Problems & Homework Problems
Read Chapter and Begin Smartbook	Start Practice Problems					Create Chapter Summary

Step	Key Information
Watch the Chapter Intro Video	<ul style="list-style-type: none"> <li>• These are short, high-level overviews of chapter topics so you know what big concepts you'll see in the chapter.</li> </ul>
ACTIVELY Read the Chapter	<ul style="list-style-type: none"> <li>• Take notes as you go. Note anything you are confused or unsure about – so you can revisit later.</li> <li>• Answer SmartBook questions and go back to understand why you missed every question you answered incorrectly (or had to guess about).</li> <li>• UPDATE YOUR NOTES as you learn/master topics, so you clarify topics that weren't clear at first. Do this with notations in the margins of your notes, highlight things, write-out examples, etc.</li> <li>• Watch Concept Video Overviews to reinforce content.</li> </ul>
Watch Professors work a Sample Problem	<ul style="list-style-type: none"> <li>• Watch the video of Professors Mitchell and Martin work a sample problem from the chapter, which demonstrates the use of basic chapter content. These can be found in the "Sample Problems and Applications" sub-folder in each Course Content chapter folder.</li> </ul>
Work Practice Problems	<ul style="list-style-type: none"> <li>• Try to work as independently as possible so you can assess how well you really know topics.</li> <li>• When you find yourself unsure, LOOK IT UP or check your help resources.</li> <li>• Update your notes to record the new things you understand better with practice.</li> <li>• Work problems until you get a 100% score. The point is to understand WHY it's the right answer so you can apply the right concepts to different problems.</li> </ul>
Work Homework Problems	<ul style="list-style-type: none"> <li>• Try to work problems as independently as you can, but when you aren't SURE what you are doing, GET HELP.</li> <li>• When you do look things up or get other forms of help, ask yourself WHY you haven't mastered that yet – what have you not understood up to now that still left you unsure about how to do something?</li> <li>• When you submit your work, spend time looking at everything you missed so you understand why.</li> <li>• Update your notes to record the new things you are understanding with practice.</li> <li>• ASSUME that every item you guess on, or that you missed, WILL BE TESTED ON THE EXAM. So your goal isn't to get the points on the homework; your goal should be to use the problems as feedback for how well you are learning new topics.</li> <li>• At this point if you are still unclear about something, you should contact a Teaching Assistant.</li> </ul>
Prepare a Chapter Summary Sheet	<ul style="list-style-type: none"> <li>• Summarize the key points on one or two pages. Use this process to organize your understanding of the chapter.</li> <li>• Write (or type) this out in your own words, not just highlight things in your notes.</li> <li>• Think of this as your personalized study guide for the chapter that you will use for exam preparation.</li> </ul>

## Appendix Q

### Tips from Prior Students

We asked a group of successful COMM 2010 students from past semesters if they had any specific tips for future students. They had some suggestions and I want to pass those tips along to you:

- While you're working in LearnSmart you can take screenshots of key content and examples and save them to Word or Google Docs for later use when studying. If you're reading in the eBook in McGraw-Hill Connect then you will be able to highlight, make notes, and bookmark pages.
- Many problems begin with some key information that you will need to refer back to throughout the problem. Some of these are long enough that this information would scroll off your screen as you work through the problem. You can click on the "required information" button to have that content pop up in a separate window that will then stay locked on your screen. This makes it easy to complete these longer problems without needing to repeatedly scroll up and down.
- Many of the practice and homework problems have a link at the bottom if you'd like a "hint." These hints are actually videos that show you a very similar problem and then walk you through a complete solution. A few of the other practice problems have a video narrated by Professor Martin that explains how to solve that exact problem. Many prior students reported that these "hints" and supplemental videos were very helpful.
- Once the due date has passed, you'll be able to go back into old practice and homework problems and begin a "Study Attempt." A "Study Attempt" gives you a blank assignment with your answers removed so that you can start over from the beginning. This doesn't change your grade on the assignment; but it can be good practice while you're reviewing the earlier chapters for the final exam.

## Appendix R

### COMM 2010/2020 Exam Analysis

Name: \_\_\_\_\_ Course:  2010  2020 Exam

This form will help you to analyze your exam performance and find strategies that work best for you in learning the material for this course. Self-assessing your progress and adjusting your study strategies accordingly is what effective learners tend to do. Please answer the questions (A-G) below sincerely. Your responses will have no impact on your grade, but they will inform the instructional team about how we can best support your learning.

A) What percentage of your exam preparation time was spent on each of these activities?

Activity	Percentage
1. Skimming textbook chapters	
2. Reading textbook chapters thoroughly	
3. Reviewing your own notes	
4. Reviewing Professor Martin's walkthrough videos in Blackboard	
5. Re-doing the Connect chapter practice questions and homework in Study Attempt mode	
6. Posting questions on Teams and/or working with a study group	
7. Meeting with TAs	
8. Completing the end of chapter demo cases (2010) or foundational 15 (2020)	
9. Working on practice exam questions	

## Appendix S

### COMM 2010 Anxiety Trigger Responses

Tests and Testing	Homework/not understanding content/grades	Time management	Transactional distance	Other
Having to teach myself, concern about exams	doing homework	I have less time to finish	Having to teach myself, concern about exams	Always
We had exams and also when I struggled to understand content in a chapter because I often felt helpless since the class was not in person.	We had exams and also when I struggled to understand content in a chapter because I often felt helpless since the class was not in person.	I have a lot of schoolwork building up	We had exams and also when I struggled to understand content in a chapter because I often felt helpless since the class was not in person.	Lack of sleep, excessive sweating, heart palpitations [sic]
I did not do well on the first exam or I did not understand the material	I did not do well on the first exam or I did not understand the material	a lot of work was assigned to us with not enough time to complete that work.		
doing homework problems, studying for exams, taking exams and after submitting exams	doing homework problems, studying for exams, taking exams and after submitting exams	I have a lot of assignments for a lot of different classes and extracurriculars at the same time.		
there was an upcoming exam, or I didn't understand a concept	there was an upcoming exam, or I didn't understand a concept	I don't have much time to study for a test.		
studying for an exam.	I checked/received grades, when deadlines for submitting work approached, when I had a hard time understanding the chapter	I checked/received grades, when deadlines for submitting work approached, when I had a hard time understanding the chapter		

Tests and Testing	Homework/not understanding content/grades	Time management	Transactional distance	Other
Testing due to the time constraint and practice problems due to the mid week due date	I didn't understand something.	Testing due to the time constraint and practice problems due to the mid week due date		
studying for exams, taking exams, doing all work for this class basically	problems, especially during an exam	studying for exams, taking exams, doing all work for this class basically		
Assignments were due and I was behind; night/day before exams	I thought I was unsure of the material.	Assignments were due and I was behind; night/day before exams		
submitting homework or when exam scores are released	submitting homework or when exam scores are released			
I struggled to understand specific chapters or problems, especially during an exam	I struggled to understand specific chapters or			
completing assignments and taking exams in accounting	completing assignments and taking exams in accounting			
before submitting homework and tests	before submitting homework and tests			
Exams and their affect on my grade Tests	Exams and their affect on my grade			
I would do terribly on a test or have a test coming up.				
Before Exam 3 and 4				
Exams were upcoming				
Preparing and taking exams				

Tests and Testing	Homework/not understanding content/grades	Time management	Transactional distance	Other
I thought I did well on exams but didn't.				
preparing for exams				
right before taking the exam, and right after getting my exam scores back.				
taking exams				
taking exams				
before exam				
The answer choices seemed tricky or surprising				
preparing for exams				
Taking exams, studying for exams, thinking about exams				
I began the exam and had to focus my brain while trying to ignore the ticking timer.				
I took my first COMM 2010 exam I had to calm down myself many times while taking it. I changed locations when I took the second, third, and final exam, and that seemed to help me mentally.				
*NOTE: Student individual responses abbreviated in Tests and Testing column. There were 24 additional responses pertaining to course exams.				

## Appendix T

## COMM 2010 Sources of Help for Anxiety Responses

Family	Friends	Professional/ medication	Self	Instructor/TA/tutor	Other
my professor, TAs, or family.	my professor, TAs, or family.	Professional therapists	Making sure I was over-prepared for each assessment.	my professor, TAs, or family.	I did not
my dad, who is a CPA	my friends	a psychiatrist	Myself	TAs and Professor Mitchell	[Student Health and Wellness Center]
	other students in the class, my tutor	Sports psychologist		other students in the class, my tutor	
parents	Friends	medication and therapy	making notes for those chapters which will be covered in the exam		
friends and family	friends and family	therapists and prescribed medication	N/A - personally good at dealing with that situation on my own		
Friends, parents	Friends, parents	Therapist and family			
Therapist and family	My friends, myself	a therapist	My friends, myself		
	Myself and friends		Myself and friends		
	Attending tutoring session, working with friends		Attending tutoring session, working with friends		
Friends and family	Friends and family				
My friends and family	My friends and family				



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<b>Family</b>	<b>Friends</b>	<b>Professional/ medication</b>	<b>Self</b>	<b>Instructor/TA/tutor</b>	<b>Other</b>
friends and family	friends and family				
	Friends				
	my friends				
	talking with friends				
	Friends				
	My friends				

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## Appendix U

## COMM 2010 Reasons for Not Connecting with the Instructor

Did not need to	Experienced a barrier (transactional distance)	Did not have time	Connected w/TA	Other
I did not feel the need to	I guess I felt shy or overwhelmed because the class was so large.	Never had time due to other classes and obligations	TA's answered my questions	I wanted to, but ended up forgetting to do so as I was caught up in Finals and it slipped my mind
I never had any problems and I wasn't looking to connect.	Since this was an online course, Prof Mitchell didn't really feel like my professor - it was a little disconnected (in my opinion)	time	Did not need instructor help since I had TAs	just not good at reaching out
TA's answered my questions	With all of my other classes and responsibilities to keep up with, I didn't feel like I had time for one more thing. Also, with the online environment, it was more difficult to feel connected to the instructor at all	With all of my other classes and responsibilities to keep up with, I didn't feel like I had time for one more thing. Also, with the online environment, it was more difficult to feel connected to the instructor at all		No particular reason
Didn't have time or didn't feel like I needed to	I just didn't have an opportunity to do so.	Didn't have time or didn't feel like I needed to		She doesn't make the content
Since it was an online class, I felt like there was a barrier between students and instructor. I also had no reason to connect with the instructor.	Since it was an online class, I felt like there was a barrier between students and instructor. I also had	I did not have the time do so and her office hours did not fit with my schedule		Any questions I had I had friends who would help

Did not need to	Experienced a barrier (transactional distance)	Did not have time	Connected w/TA	Other
	no reason to connect with the instructor.			
Did not have a strong need to do so	The class was online and fully remote, asynchronous, and virtual. Could not connect with a teacher through on an online screen.	I didn't have time.		The other office hours worked better with my schedule.
I didn't feel the need, but she was very easy to reach!	the class was very big and although she is very nice and helpful I thought most people didn't actually meet with her			
There's 600 plus people in the course, and it's an online course. There's not much to connect with the instructor on.	There's 600 plus people in the course, and it's an online course. There's not much to connect with the instructor on.			
It didn't feel necessary for my learning	Felt awkward because I didnt [sic] have a particular question			
Didn't really feel the need to	It wasn't really available to connect with the instructor.			
No need for this. TA's were resourceful enough	Too many students			
Did not see the need to do it if I was doing well in the class.	I don't really know her.			
Didn't have major questions	Other than a couple emails back and forth we never got the chance to actually connect			
I never needed to	The format of the course makes this difficult			

Did not need to	Experienced a barrier (transactional distance)	Did not have time	Connected w/TA	Other
Didn't think it was necessary although I thought about it	There are so many students			
I didn't need to.	It felt weird to connect with the instructor with an online class. It seemed like we were expected to go to the TAs way before we would go to the professor.			
The class wasn't that hard so I didn't need to go to office hours	It is an online class and often hard to make personal connections			
Didn't need to.				
I didn't have a reason to				
I did not need help				
Didn't feel the need.				
I never felt like I had a question that should be brought to the teacher as opposed to a TA				
Because I could handle it myself.				
Did not need to, was comfortable with the material				

## Appendix V

### COMM 2010 Reasons for Connecting with the Instructor

Test/grades	Sought help	Establish a relationship	Emotional support	Other
Issue with test	Get help and connect on a general basis	To form a better relationship with my professor.	I was feeling very discouraged by the course and sought her support and guidance.	Through Zoom and email
I asked for advice regarding studying for the final exam since I did not do well on the prior 3.	I have [academic] accommodations and she clarified those and was very helpful ensuring that my needs were met, and I had to reschedule my final exam in that course which she was also very willing to help with	To form a relationship with her as we did not meet in person during "class."	Regarding stress before the final exam	I set up a zoom meeting with her
To go over a past exam that I did not do very well on and get study tips for exams moving forward	Help with coursework	Wanted to get to know her better and ask for her advice on topics and studying	I connected with the professor following the [school tragedy] because she was really nice and accommodating to students about it and I felt very appreciative of that.	Office hours
to discuss poor performance on exams and health issues that were holding me back in the course	For questions about finding a tutor	Just to get to meet her in person and also ask a couple questions!		Zoom
Ask questions regarding preparing for exam	To ask questions re extra credit etc	I wanted to be able to initiate a direct relationship with her so that I could be more free to		Saw her on the street

Test/grades	Sought help	Establish a relationship	Emotional support	Other
to review my score from the first exam and how to improve.	[Academic] accommodations	ask questions and discuss my progress in the course. To meet her		By email
I personally connected with the instructor about a similarity between us and by attending the first meet and greet of the semester. I also communicated with the instructor about a regrade request.		I personally connected with the instructor about a similarity between us and by attending the first meet and greet of the semester. I also communicated with the instructor about a regrade request.		email, communication
To get extended time on exams after I experienced a concussion.	The instructor was very helpful and I felt like I had a personal connection with her. I would ask her many content questions.	I met with Jill at the beginning of the semester as a meet and greet to introduce myself.		She is extremely kind and a great resource
I spoke to my professor about my poor performance on the first test and what I should do going forward in the course, which helped relieve some of my anxiety.	To introduce myself in the beginning, then to better understand a certain topic in later meetings	To introduce myself in the beginning, then to better understand a certain topic in later meetings		
Exam feedback and review	To introduce myself in person and get advice about a personalized study plan	To introduce myself in person and get advice about a personalized study plan		
to go over my exam and study habits	To ask about retaking the course/technical questions about the course			

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Test/grades	Sought help	Establish a relationship	Emotional support	Other
or help with content and clarification on exams	I connected to try to learn about better study tips or to clarify topics if I was confused			

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## Appendix W

### Other insights from student interviews

During the student interviews, I asked each participant to share what they would change about the course. The following answers did not directly correspond with the overall findings, so I present them here.

Iris and Rose suggested scheduling changes. Iris said additional weekly office hours would have improved her experience since scheduling conflicts precluded her from attending both office hours and the live prior week review sessions. Rose offered that more spacing between assignment due dates and avoiding weekend due dates would be a welcome change.

Violet and Daisy suggested changes to the current exam policy. Violet would like the option to request more time to complete exams (4 survey respondents also identified the test-timer as anxiety-inducing—see Appendix S).

Finally, Daisy shared that she would have liked to have received partial credit for exam problems:

Like, I feel like the biggest thing I would change is, if there was a way to give partial credit on exams, because I know um, the way that it's structured is that you kind of it's kind of like the homework and practice problems where you like fill in the answer in the little section and then you keep going through the exam. But like, a lot of the questions would be multi-step questions. And so if you kind of messed up one part, you couldn't show your work or anything like that, the way you would in an in-person class, especially something so quantitative is accounting. And so I know like, there were a few times where I kind of had 95% of it correct. And then made one mistake and kind of 10 points off, like the whole questions wrong. And so like, if there was a way to upload our work, or like, show or work or get some sort of partial credit, um, feel like that would be absolutely.