

## CONTENTS

**1 Student Success: Improving Comprehension by Focusing on Instruction**

*Editors, Kristin Conley and Heather Johnson-Taylor*

**6 Using the Generation Effect to Enhance College Learning Strategies**

*Lauren Hensley, Ohio Wesleyan University*

**16 Reading Academic Texts: How Professors and Graduate Students Read for Different Purposes**

*Ying Suet Michelle Lung, Brigham Young University*

*Grant Eckstein, Brigham Young University*

*Katie Watkins, Brigham Young University*

**33 Increasing the Literacy Abilities of Developmental College Students through Integrated Orthographic Instruction**

*Megan Trexler, Delaware County Community College*

*Kathryn Hastings, Delaware County Community College*

*Elizabeth L. Tighe, Georgia State University*

# JCLL

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## **ABOUT JCLL**

The *Journal of College Literacy and Learning* (JCLL) (ISSN 0738-9523) welcomes material related to advancing scholarship on reading, writing, and academic success at the postsecondary level. JCLL is published by the College Literacy and Learning Special Interest Group of the International Literacy Association and is intended to provide a forum for the exchange of information regarding research, theory, and practice.

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*From the Editors*

# ***Student Success: Improving Comprehension by Focusing on Instruction***

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Change is a constant of life. Philosophers, scientists, and, actually, any individual reflecting on the past would agree with this statement. It especially true in higher education. Faculty and administration are continually engaged in research focused on ways to improve academic success (Cantwell et al., 2022). This is important work. Colleges and universities must continually examine and reexamine practices to find out what is working and what is not working for students entering the campus at that time.

As we introduce this volume of *JCLL*, we are transitioning out of restrictions

connected with COVID -19 and the global pandemic, which means making changes. Things will never go back to the way they were. Everyone is different now. Students are different. Faculty are different. How students learn has changed. Instruction must change. Students entering campus this fall have an increased need for tailored instruction to support their learning and fill in their educational gaps (McMurtrie, 2022).

Volume 48 of *JCLL* focuses on the critical role of understanding the learner. The need has never been greater for educators to include instruction that supports increasing

metacognition (Dennis & Somerville, 2023). Paying specific attention to study strategies designed to support better comprehension within their specific area of instruction. Instruction and strategies scaffolded to meet the learner where they are and support them as they develop and grow in their understanding.

The author of **“Using the Generation Effect to Enhance College Learning Strategies”** explains how important it is for students to play an active role in their learning—essentially incorporating the generation effect. Their findings suggest ways tutors, academic coaches, and instructors can integrate this generation effect into active and productive study strategies, which results in scaffolded effective learning.

In **“Reading Academic Texts: How Professors and Graduate Students Read for Different Purposes”** the authors explore the importance of reading with a purpose. Their findings illustrate the important role educators have in encouraging students to become academic readers.

Finally, in **“Increasing the Literacy Abilities of Developmental College Students through Integrated Orthographic Instruction”** the authors explore the impact of orthographic instruction on developmental college readers’ morphological awareness and reading comprehension. Their findings suggest this practice yields a deeper understanding of the language and further motivated student learning.

We hope the manuscripts presented in Volume 48 will be beneficial to you as you continue to grow in your teaching practice and research. It is our intention to provide scholarship on current trends to better support you as scholars and practitioners in the field of college literacy and learning.

We appreciate the authors and thank them for sharing their important work, and for the many dedicated reviewers who give of their time, energy, talents, and expertise to *JCLL*. Finally, we would like to thank you, dear readers, for your interest and dedication to college literacy and learning and your support of this publication.

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# *Using the Generation Effect to Enhance College Learning Strategies*

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## ABSTRACT

*The generation effect occurs when students recall information successfully due to having played a role in creating, elaborating upon, or personalizing the information when attempting to learn it. This article first explores the characteristics of the generation effect and reviews its connection to learning principles. Then, the focus shifts to applying the generation effect, suggesting ways college students can learn to integrate it into active and productive study strategies. Practical applications include generating study questions, creating study tools, and engaging in dual coding. In addition to describing specific study methods, the article examines the role of tutors, academic coaches, and instructors in modeling and scaffolding effective learning.*

*Keywords: postsecondary literacy; reading; learning strategies; generation effect*

The academic demands of college can be a major shift from what students encounter in high school, especially in terms of the pace, depth, and student-directedness of learning (Steele & McDonald, 2008). In surveys, most college students report never having learned how to study in high school (McGuire, 2015). As a result, incoming college students often do not have a strong background in using effective study strategies and understanding why they work (McGuire, 2015). Gaining

these insights can help students become more self-aware and intentional in how they approach studying. An essential principle is that learners are more likely to remember information they generate than information they passively receive; this is the essence of the generation effect, first described by Slamecka and Graf (1978). Four decades of subsequent research in laboratory and practical settings have shown the benefits of the generation effect and provide insight into

why and how it enhances learning (for a review, see McCurdy et al., 2020). The purpose of this article is to introduce learning principles related to the generation effect that can be applied to students' study strategies. After presenting a theoretical foundation, the author provides examples of specific strategies and discusses ways that awareness of the generation effect can bolster efforts to support college students' learning.

### **Why Does the Generation Effect Occur?**

The generation effect—that is, the benefit of actively generating information as part of the learning process—has been observed in a number of experiments. Researchers have documented enhanced memory for various types of information, including individual words, images, solutions to math problems, free and cued recall, recognition, and comprehension (see Bruning et al., 2004). In a meta-analysis, Bertsch et al. (2007) calculated that the generation effect added a benefit of approximately half a standard deviation above simply reading, leading the authors of the review to call the generation effect a “robust and consistent finding” (p. 203).

To understand what the generation effect is and why it occurs, it is useful to view it in the context of other principles of cognition. One explanation for the memory-enhancing properties of the generation effect is that generating material creates explicit memories; the learner is consciously aware of having been through the process of generating information, which makes remembering the information more likely (Bruning et al., 2004). A second explanation is that deep rather than shallow processing accompanies generation. Learners who generate their own mnemonic devices, rather than using mnemonic devices provided by another person, engage in deep and effortful processing that makes the content more memorable (Tullis & Qiu, 2022). Additionally, when generating information, a learner makes connections between prior knowledge and new information (Bruning et al., 2004). Linking old

and new content promotes organization as well as storage, both of which are key components of memory (Ormond, 2012).

Generation can be thought of as an act of elaboration that adds meaningfulness to content, increasing how memorable it is (Schunk, 2012). This view gives further insight into why and how generation enhances learning. Generating a meaningful example, image, summary, metaphor, explanation, or other cue enhances a learner's ability to remember details about a target item (McNamara & Healy, 2000; Schindler & Richter, 2023). Also, when learners generate content, they engage in problem-solving to process relevant information. In other words, “generation should actually be thought of as enhancing the processing of whatever type of information subjects used in order to perform the required generation task” (deWinstanley et al., 1996, p. 33). Taken together, these principles explain why learners better understand and remember information when they create meaning from it rather than simply reviewing content in its original form (Schroeder et al., 2018).

A study conducted by deWinstanley and E. Bjork (2004) examined whether students would improve their memory if given the opportunity to reflect on the generation effect. In a multi-stage experiment, students took a reading comprehension test based on textual information they generated as well as textual information they read. A portion of students then learned that they had remembered a greater percentage of the information they had generated. When these students were given new reading assignments with a mix of generation and read-only tasks, they recalled a higher percentage of both types of information. The researchers attributed these outcomes to students' awareness of the generation effect, which led to improvement in overall information processing. They concluded that “not only can generating produce a memorial advantage over reading when learning new information; it can ... also

lead to the spontaneous development of processing strategies for future to-be-read material that render it just as well learned as generated material” (p. 952). This finding suggests it is valuable for students to gain knowledge of the generation effect to enhance their learning. How this can be done is the focus of the remainder of the article.

### **How Can College Students Learn to Apply the Generation Effect?**

College students’ default approaches to studying often involve reviewing assigned readings and looking over notes (Callender & McDaniel, 2009). Because these activities are passive, the results are often disappointing when relied upon as study methods (McGuire, 2015). In contrast, employing the generation effect can help students actively process what they are learning and develop a range of meaningful encoding cues that can be recalled in a retrieval context, such as on an exam or when using a concept in real life.

The generation effect can be introduced through both direct and embedded instruction as a simple but powerful tool to help students improve their learning strategies. Direct instruction can take place in contexts such as academic coaching, tutoring, workshops, and stand-alone academic success courses, which exist outside of a specific curricular setting (Wolters & Hoops, 2015). Embedded instruction integrates learning strategies within an existing classroom context, such as a chemistry lab or English class (Dignath & Veenman, 2021). Teaching students to employ generative learning strategies, as with other study strategies, involves providing structure that is gradually transferred over to the student until they can use the strategy independently (Azevedo & Hadwin, 2005). This process

involves directly describing the strategy, modeling how to use it, providing practice using the strategy, and helping the learner assess the strategy (White & DiBenedetto, 2015).

The approaches in this article reinforce and build upon ways in which educators may already incorporate the generation effect into their teaching and student support practices. Specifically, three areas of focus will help students use study strategies in ways that activate the generation effect. One, students should make something of or from the content, rather than keeping it in its original version. Two, students should seek to enhance personal meaningfulness or relevance. Three, students should engage in elaboration, that is, expanding on what they are studying by generating examples, analogies, or imagery (Endres et al., 2017). These factors can be incorporated by helping students generate questions, create personalized study tools, or engage in dual processing, discussed in turn below. The section ends with final considerations for helping students see the benefits of the generation effect in order to improve their studying.

### **Generating Questions**

Students can generate questions in multiple ways to actively engage with course content. Question-based study methods prompt generation through reflecting on course content (Tuckman, Abry, & Smith, 2008). Three effective question methods are elaborative interrogation (i.e., asking and answering why), guided peer questioning (i.e., having peers ask one another questions about content), and question-and-answer outlines (i.e., a structured approach to writing questions and answers about the most important points of a text or lecture).

Figure 1. "Types of Study Questions" Handout

| Types of Study Questions                                                                                                                                                                                                                                                                                                                               |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <b>1. Reflection Question</b>                                                                                                                                                                                                                                                                                                                          |  |
| A Reflection Question reflects the main point of a paragraph or small section of notes. In a text, it often can be found in the first sentence. Other times, it may be signaled by italics, boldface, items in a list (1, 2, 3 ...), or signal phrases (e.g., "the definition of ...," "the most important ...").                                      |  |
| Common types of Reflection Questions:                                                                                                                                                                                                                                                                                                                  |  |
| <ul style="list-style-type: none"><li>• Definitional question – "What is _____?"</li><li>• Cause question – "What causes _____?"</li><li>• Effect question – "What is the use/impact/effect of _____?"</li><li>• Comparison question – "How does _____ compare with _____?"</li><li>• Sequence question – "What sequence does _____ follow?"</li></ul> |  |
| Practice writing a Reflection Question below:                                                                                                                                                                                                                                                                                                          |  |
| RF:                                                                                                                                                                                                                                                                                                                                                    |  |
| <b>2. Recap Question</b>                                                                                                                                                                                                                                                                                                                               |  |
| A Recap Question recaps (summarizes) the overall point of a chapter or topic. In a text, it can typically be found in the heading or subheading. In a lecture, it may be the topic in the syllabus or title slide. This type of question often incorporates many reflection questions as it summarizes the chapter or topic.                           |  |
| Common types of Recap Questions:                                                                                                                                                                                                                                                                                                                       |  |
| <ul style="list-style-type: none"><li>• Analysis question – "What are the major factors in _____, and why?"</li><li>• Compare/Contrast question – "How are _____ similar and dissimilar?"</li></ul>                                                                                                                                                    |  |
| Practice writing a Recap Question below:                                                                                                                                                                                                                                                                                                               |  |
| RC:                                                                                                                                                                                                                                                                                                                                                    |  |
| <b>3. Reasoning Question</b>                                                                                                                                                                                                                                                                                                                           |  |
| A Reasoning Question is not answered directly in the text but is based on interpretation by the reader. This type of question involves creative and/or critical thinking.                                                                                                                                                                              |  |
| Common types of Reasoning Questions:                                                                                                                                                                                                                                                                                                                   |  |
| <ul style="list-style-type: none"><li>• Speculative question – "What if _____?"</li><li>• Application question – "How do/could _____?"</li><li>• Interpretive question – "Why does/is _____?"</li></ul>                                                                                                                                                |  |
| Practice writing a Reasoning Question below:                                                                                                                                                                                                                                                                                                           |  |
| RS:                                                                                                                                                                                                                                                                                                                                                    |  |

When using these methods, learners think of the information in their readings or notes as answers and generate questions that are answered by this content. Figure 1 provides a sample handout to teach students to use the generation effect by means of study questions.

By reflecting on the source material, creating questions, and writing (or speaking)

the answers, students add something to the material they are seeking to learn. As a result of engaging in this process, known as elaboration (Endres et al., 2017), they have generated content, rather than merely having received it. This effortful interaction with to-be-memorized material enhances its memorability. In most testing situations, students are asked

questions and must provide the answers. If students study by generating questions and answers, they are likely to find that the retrieval cues match the encoding cues. Transfer-

### **Creating Study Tools**

Students can create a variety of study tools to produce the generation effect. These methods can include creating summaries of major topics, flash cards of key concepts, and mnemonic devices for difficult-to-remember lists. Several popular websites and apps provide students with the option of studying with a bank of content summaries, flash cards, or mnemonic devices (e.g., acronyms based on the first letter of each word to be memorized). When study tools are developed by others, however, they lose some of their potency. Externally created tools place students in the position of receiving rather than generating material. For example, after an exam a student might find that they remembered the mnemonic device but not what it meant. The tool lacked personal meaningfulness and the student did not have explicit memories of creating it. Therefore, it was difficult to translate the mnemonic back into its component parts.

Preparing students to generate their own study tools is a process. To begin, tutors or academic coaches can describe the steps involved in creating an effective summary, flash card, or mnemonic device and externalize their thought processes as they walk through an example. This method, known as metacognitive modeling, provides a foundation for students who are developing effective learning strategies (Tanner, 2012). Students can then practice creating their own study tools using these principles. These efforts can be supported by templates or instructional handouts until students make the study tools

appropriate processing will thus take place, enhancing students' ability to both recognize and recall material (e.g., McNamara & Healy, 2000).

their own (Caprara et al., 2008). Instructors also can allocate a few minutes of class time for these activities, a practice known as "small teaching" that enhances students' learning (Lang, 2016). Once students understand how and why to make their own study tools, instructors can reinforce the new strategies by having students create and turn in study tools for homework or extra credit. When students construct their own study tools, personal meaningfulness is enhanced and the generation effect occurs. See Figure 2 for a sample handout that could help students create useful flashcards based on these principles.

### **Engaging in Dual Coding**

A cognitive strategy that can further enhance students' study tools is dual coding. Students who engage in dual coding by processing information both verbally and non-verbally have stronger retention of information than those who encode information with a single cue (Dogomeo & Aliazas, 2022). Dual coding is the cognitive process at play when students organize information through charts, diagrams, and concept maps (e.g., Bauer, 2014). Through direct or embedded instruction, students can learn basic procedures for generating charts, diagrams, figures, images, mind maps, or cartoons. As with teaching other study methods, the key is to model dual coding methods and then provide guided practice to help students create their own. As Ormond (2012) advises, "learning something by constructing it on one's own makes it more memorable than having someone present it in a prepackaged format" (p. 196).

Figure 2. “Creating Useful Flashcards” Handout

### Creating Useful Flash Cards

**General Tips**

- Create flash cards based on class notes, textbooks, additional readings, etc.
- Include only *one* major point per flash card. Too much information on any one card can be distracting.
- Use different colored flash cards to designate relationships among flash cards. For example, in creating history note cards, you could use yellow to represent the Civil War, blue to represent the Revolutionary War, and red to represent World War I.

**Types of Flash Cards**

- **Q&A:** On one side, write a question; on the other side, write the answer.

*Front*  
  
What are the components of the hydrosphere?

*Back*  
  
ocean, streams, lakes, glaciers, underground water sources
- **Word pictures:** On one side, write the word or concept; on the other side, draw a picture to illustrate its meaning.

*Front*  
  
Acute

*Back*  
  
1. angle measuring less than 90 degrees  
2. sharp or severe in effect
- **Mnemonic devices:** On one side, write the mnemonic device you've created; on the other side, write out the concepts that relate to the mnemonic device.

*Front*  
  
Order of operations (PEMDAS)

*Back*  
  - Parentheses
  - Exponents
  - Multiplication
  - Division
  - Addition
  - Subtraction

**How to Use Flash Cards**

- Separate the cards into two groups as you review the entire pile: Do Know and Don't Know.
- Review the Don't Know pile until you can place all the cards into the Do Know pile.
- Test yourself on flashcards a bit at a time, spaced out over a few days or weeks. Keep track of which concepts tend to fall into the Don't Know pile. Pay extra attention to this pile, and change the information/format for any cards that are especially difficult to memorize.
- Flip the flash cards over and try to anticipate questions when reviewing the answers (like Jeopardy).
- Visualize the big picture by organizing flash cards into categories (similar topics, opposites, cause and effect, steps in a process).

Dual coding is at play in the word picture example in Figure 2 and can also be employed

through creating mental imagery or visual organizers.

### **Helping Students Assess Their Learning**

That students can adapt how they process to-be-learned information has important implications for teaching them to engage in more powerful studying (deWinstanley & Bjork, 2004). Many educators have experienced firsthand that metacognition enhances engagement and learning. Building upon this effective practice, it is advisable to teach about the generation effect from a metacognitive perspective in which students reflect on their learning processes (Sears, 2004). Individuals in a position to help college students enhance their learning strategies—whether instructors, tutors, or academic coaches—can explain to students why and how methods involving generation are effective and then work with students to assess the impact. Setting goals and tracking progress during study sessions can help students understand how and when learning is taking place (e.g., how many terms could I remember this time?). To expand the learning opportunities provided by tests and quizzes, instructors can have students complete a set of questions to reflect on the study tools they used and how effective they were (Lovett, 2013). Academic coaching and tutoring sessions can also provide a context to check in on how students are applying generative study strategies, assess their effectiveness, and make enhancements. If

students have tangible evidence that the generation effect is having a positive impact on their learning, this improvement acts as an incentive to continue using these methods. Alternatively, guided self-assessment can help students monitor and reflect on their studying in order to improve the when, where, and how of their approaches (McCabe, 2011).

### **Conclusion**

Helping students learn how to learn is just as valuable as—and sometimes more valuable than—simply conveying content. Effective learning can be taught in the context of a tutoring or coaching session, academic success courses or workshops, or incorporated into small teachable moments across the curriculum (McGuire, 2005; Weinstein et al., 2000). The generation effect draws on how memory works and can be incorporated into a variety of teaching and study methods. Rather than adding an isolated set of practices, the generation effect complements efforts to enhance metacognition, active reading, and strategic learning. With explanation, modeling, practice, and reflection, students can become experts in using the generation effect for enhanced learning.

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# *Reading Academic Texts: How Professors and Graduate Students Read for Different Purposes*

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## **ABSTRACT**

*Previous studies have presented contradictory results on whether reading purpose and proficiency level affect how readers approach texts. This study analyzed the differences between the self-perceptions of 18 professors and 27 graduate students, reported in individual reflective interviews after reading a series of short academic passages and completing a summary, analysis, or synthesis task for each. Findings suggested that novice and expert readers approach texts differently depending on the purpose of the task they were preparing to complete. Professors reported more strategy usage in preparation for all tasks, while students reported placing more emphasis on passages main ideas in preparation for summary tasks. More students than professors reported drawing upon their personal background in preparation for summary tasks and offering evaluative commentary in analysis and synthesis tasks. Professors and students differed in their perceptions of the locus of control for the reading activity, with professors blaming the poorly-written texts for any confusion or misunderstanding and students placing the locus within themselves. To help students become academic readers, teachers must help them build confidence in their strategy usage.*

*Keywords: postsecondary literacy; reading; purpose; strategy use; graduate student; expert*

## Introduction

Academic reading is an essential yet difficult skill to learn. Scholars have indicated that, out of the four English language skills, reading skills are a significant contributor to college success (Evans et al., 2015; Anderson et al., 2014). Previous studies showed that professors perceived reading as the most critical skill for college success (Anderson et al., 2014) because college students often have to read at least 40 pages of academic text each week per course (Arum & Roksa, 2011). Academic reading is cognitively challenging because it “requires that we read and interpret informational texts in line with the tasks that we engage in and the goals that we set or are set for us” (Grabe, 2008, p. 5). While this skill can be difficult for first language (L1) learners who often take their reading skills and backgrounds for granted, it is even more demanding for second language (L2) learners, who may be learning the linguistic and rhetorical conventions of the American academic register for the first time. Hermida (2014) suggested that university students should interact with academic texts in ways that differ from other texts using what he calls a “deep approach”: a collection of in-depth academic reading strategies. It is imperative, therefore, for teachers to help students acquire academic readings skills so they can read, comprehend, and interpret academic texts effectively.

People have different preferences when it comes to reading. Some of these preferences are the result of individual differences, but others are the result of experience and training. Since the present research is concerned with the reading approach of novice (graduate student) and skilled (professor) academic readers, the following section will explore how reading purpose and proficiency level influence how readers approach the text.

## Reading Purposes

Reading purpose determines how readers approach a given text. According to proponents of ideas such as Multiple Literacy

Theory (MLT), reading is not a one-size-fits-all activity but rather a complex set of skills and approaches that vary depending on the type of text and what readers hope to gain from it (Geisler, 2013; Street, 2015). Within the context of the university, students are expected to be skilled readers in academic registers. Academic readers may engage texts with purposes and strategies less common to other reading contexts, such as searching for information, skimming, gleaning factual information from the text, integrating information with previous learning, preparing to write a response, critiquing the text, and acquiring general comprehension even if the text is above their reading level (Grabe, 2008). Within the academic context, readers are expected to be able to summarize, analyze, and synthesize what they have read (Eckstein et al., 2020). Bloom's Taxonomy ranks these three tasks in order of increasing difficulty, with summary being the easiest and synthesis being the hardest (e.g., Baghaei et al., 2020). Preparing to complete a summary, analysis, or synthesis task can influence the specific ways in which readers approach a text (Eckstein et al., 2020). Much research has demonstrated this connection between reading purpose and reading behavior. For instance, readers approaching texts with different purposes in mind have different beliefs about their level of comprehension, spend more or less time reading and are more or less accurate in their estimates of how long reading will take, utilize different reading strategies, and display different visual behaviors (Kunze et al., 2013; Linderholm et al., 2008; Linderholm & Wilde, 2010; Zhang & Duke, 2008). Linderholm and Wilde (2010) randomly assigned 90 native-English-speaking participants to read six expository texts for either study or entertainment purposes. Readers were asked to imagine that they were in that assigned situation and complete four tasks regarding their understanding of the texts. Results showed that participants' beliefs about their understanding were better while reading for academic purposes than for entertainment

purposes. Zhang and Duke (2008) asked 12 adult, competent Internet readers to complete three electronic reading tasks, each with a different purpose: reading for specific information, general comprehension, and entertainment. Results showed that different patterns of reading strategies were adopted for different purposes.

While many previous studies have examined readers' beliefs and strategies through self-reporting methodologies, other researchers have used eye-tracking technology to confirm behavioral differences when reading for various purposes but with mixed results. Liu et al. (2010), recorded the gaze of 22 participants while completing four web search tasks. Results showed that reading measures differed significantly across tasks. Kunze et al. (2013) measured the eye movements of eight Japanese participants reading for different purposes across five document types in Japanese (novels, manga books, fashion magazines, newspapers, and textbooks). The experiment showed that document types could be detected from readers' visual behavior, indicating that text genre—and perhaps task purpose—impacts how readers approach a text. In contrast to these studies, however, Eckstein et al. (2020) found contradictory evidence when they explored the academic reading behaviors of 27 novice (graduate student) and 18 expert (professor) academic readers. Participants' eye movements were recorded while reading six paragraphs of academic texts for different purposes (summary, analysis, synthesis); each text had three integrated and four non-integrated APA-formatted citations. Results showed that reading purposes affected how participants visually interacted with citations but not the text overall. Eckstein et al. did not report readers' perceptions of their reading processes; thus, it is unclear how the academic nature of their experiment affected reading behaviors. Reflective inquiry is therefore needed to better understand their contradictory findings.

### **Reading Proficiency**

Apart from task purposes, another factor affecting how readers interact with academic texts is the readers' proficiency levels. According to the Institute of International Education (2022), there are about a million international students in the United States, forty thousand of whom are enrolled in Intensive English Programs (IEP). According to National Center for Education Statistics (NCES) (2021), there were over five-million English Language Learners (ELLs) enrolled in public K-12 across the United States in 2019, a number which has increased by two million over the past twenty years. The needs of these students often vary, but most could benefit from a boost in their academic reading proficiency. Therefore, there is an increasing and compelling need to investigate how readers of different proficiency levels engage in academic text.

Depending on their proficiency levels, readers approach texts differently in terms of reading strategies and attentiveness, suggesting different levels of strategy usage. Leinhardt and Young (1996) found that novice and expert historian readers differed in their attentiveness to source information. Scholars have also indicated that proficiency levels impacted readers' source awareness (Bazerman, 1985), paraphrasing skills (Roig, 1999), and strategy usage in general (Anderson, 1991; Block, 1992; Zhang, 2002). Sheorey and Mokhtari (2001) compared the usage of different academic reading strategies (cognitive, metacognitive, and support strategies) among non-native and native English readers. Findings showed that native readers, compared to non-native readers, were more reflective and self-regulated in cognitive processes while reading in English. Reynolds and Rush (2017) also found similar results. They compared the read-aloud sessions of literary texts among four novices (first-year college students) and four experts (professors). Results showed that professors used more strategies and engaged in higher-order thinking skills by hypothesizing, noticing vocabulary, and questioning. In the same vein, Madhumathi and Ghosh (2012) showed that

more competent readers used more reading strategies than more novice readers did. Despite these compelling and intuitive observations, some researchers have found contradictory relations between proficiency and reading skills. Huang and Nisbet (2014), for instance, found that advanced readers used fewer strategies than intermediate readers. They investigated the relationship between reading strategy usage and reading proficiency (intermediate and advanced) among 121 adult ESL learners. Findings revealed that advanced adult ESL learners used fewer strategies than intermediate learners. Readers may also approach texts similarly in some contexts, even though they differ in proficiency levels. Eckstein et al. (2020) concluded in their eye-tracking study that despite differences in participants' academic reading skills, readers did not differ much in terms of how they read words or academic citations. Both students and professors spent significantly less time reading citations. One way to account for these contradictory results is to obtain reflective analysis data from the same readers since knowing their self-perceptions can help us visualize their thinking process.

### Research Questions

There are possible reasons for the contradictory findings presented earlier in this section. One way to account for differences in academic reading skill may stem from the fact that professors have read and written numerous articles and manuscripts throughout their careers. Those opportunities have provided them with far more exposure and practice with academic reading. However, there is limited literature on whether academic readers differ in strategy usage. Vygotsky's (1978) Zone of Proximal Development theory suggests that learners can eventually do things independently if provided with enough scaffolding, such as from instructors or more advanced peers. Knowing how expert academic readers approach a text is essential when seeking to improve the reading skill of novice academic readers. Therefore, this study

intended to focus on academic reading processes other than comprehension alone. We were also interested in exploring readers' internal perspectives on how they used strategies when approaching citation-heavy research.

The contradictory results presented in this section have demonstrated a need to explore students' thinking processes through interviews. With the intent of building on the study of Eckstein et al. (2020), this research explores how novice (graduate student) and expert (professor) academic readers perceive their reading and thinking behaviors while approaching unfamiliar academic writing for different purposes. We aim to answer the following research questions:

- How do professors' and students' perceptions of their reading behavior differ from one another?
- How do professors' and students' perceptions of their reading behavior differ based on their reading purposes?

### Methods

#### Participants

A total of 45 professors and graduate students in humanities- and social science-related disciplines at a university in the western United States participated in this study. An email was initially sent out to the College of Humanities and chairs of various departments to solicit participants. Participants self-selected into the studies; all who signed up were accepted. Among the 45 participants, 18 were professors with terminal degrees and publications in the fields of education, psychology, linguistics or language teaching. The professors ranged in age from 34 to 68 ( $M=43$ ) and had worked in higher education for 1-41 years ( $M=9$ ); 14 identified as male and 4 identified as female. The other 27 participants were pursuing either an M.A. (19) or Ph.D. (8) in these same fields (education, psychology, linguistics, or language teaching). They ranged in age from 23 to 46

(M=29); 11 identified as male and 16 identified as female.

### **Instruments**

**Reading passages.** Six paragraphs of approximately 250 words of academic text (M=255, SD=12) (See Appendix B) were strategically selected based on these topics: educational technology, technological affordances in the classroom, and entrepreneurship education in higher education. Topics were proximal to participants' fields of research but were distant enough that participants were unlikely to have read the materials, or other texts on these exact topics, before. The texts were chosen because they were recently published academic papers from esteemed education journals; each text had three integrated and four non-integrated APA-formatted citations. According to the Flesch-Kincaid grade level analysis, the texts were all university level.

**Interviews.** A set of semi-structured interview questions (see Appendix A) was developed to collect participants' impressions of their own reading and thinking behaviors following completion of the texts. The questions asked participants to reflect on their thinking during each set of readings, on any differences they felt distinguished their reading in familiar versus unfamiliar topic areas, and on their opinions on whether or not students and professors read academic text differently.

**Eye-tracking device and software.** As part of a larger study (Eckstein et al., 2020), participants' eye movements were tracked using an eye-tracking device and software while they read each passage. However, because the eye-tracking element of the larger study is not discussed in this current study, we will not go into more detail here.

### **Procedure**

Participants were first seated in front of a computer screen and started by reading a practice pair of paragraphs at their own pace on a computer screen. They were then given three additional pairs of paragraphs to read in

a randomized order; prior to reading each pair, they were told to prepare to summarize, analyze, or synthesize the two passages. Participants read at their own pace, but once finished with a paragraph were prevented from returning to it. All reading activities, done in one untimed setting, were part of an hour-long section in a lab setting. Most participants spent about 30 minutes reading the passages silently and completing the assigned tasks in an oral interaction with a researcher. Immediately after reading all six texts and completing the summary, analysis, and synthesis tasks, participants engaged in a 20-minute semi-structured interview in the same room to reflect on their reading experience and offer a self-evaluation of their reading behavior and thinking while reading (see Appendix A). Participants were given a paper copy of all paragraphs they had seen during the experiment to facilitate their reflection. A graduate research assistant who was trained in semi-structured interview procedures and had completed five hours of supervised interview practice conducted the reflection interviews and took detailed field notes. Because of the potential for subjective interpretation, the interviews were audio recorded so that a second researcher with extensive background in interview procedures (the first author) could review, correct, clarify, and supplement the field notes to further mitigate interview subjectivity. These notes became the basis for this subsequent analysis following narrative inquiry methods (Connolly & Clandinin, 1990; Schwandt, 2007).

### **Data Analysis**

**Content analysis.** Two researchers reviewed the reflective interviews, and passages related to each interview question were transcribed for secondary coding. The researchers then coded, categorized, and quantified participant comments using the Constant Comparative Method (Glaser & Strauss, 1967), which entailed multiple iterative rounds of reading, coding, refining, and recoding as necessary. The researchers completed this task over

multiple sessions until a perfect agreement was reached for all codes and comments. Descriptive statistics were also computed throughout this process.

### Results

We wanted to know how professors' perceptions differed from students' perceptions when it came to their own reading behavior and whether these differences were heightened by variations in reading purpose. Altogether, participants reported using 278 different reading strategies and approaches; in this section, we outline and interpret these.

### Self-perceptions of Reading Differences

Content analysis data revealed some general differences between professors and students, summarized in Table 1. Table 2 shows some example statements given by professors and students in the interviews. Professors tended to comment slightly more on their strategies for reading, while students commented more on the main ideas of the passages. Students were slightly more vocal than professors about terminology and citations, while professors were more likely to comment on their personal background and offer personal opinions and explanations on the readings.

Table 1  
*Self-reported reading approaches by professors and students*

| Category            | Example Descriptions                                                                               | Total     |      |          |      |
|---------------------|----------------------------------------------------------------------------------------------------|-----------|------|----------|------|
|                     |                                                                                                    | Professor |      | Student  |      |
|                     |                                                                                                    | <i>n</i>  | %    | <i>n</i> | %    |
| Strategies          | searching for examples, an argument, things to critique                                            | 52        | 18.7 | 43       | 15.5 |
| Main Ideas          | efforts to understand the general idea of the paragraph, getting the gist, focusing on main points | 34        | 12.2 | 57       | 20.5 |
| Terminology         | acronyms, definitions, technical terms                                                             | 12        | 4.3  | 17       | 6.1  |
| Personal Background | familiarity with a topic, ability to draw on a related concept                                     | 12        | 4.3  | 8        | 2.8  |
| Citations           | recognition of an author, awareness of citations                                                   | 6         | 2.1  | 11       | 4.0  |
| Commentary          | reflection on the ease of understanding readings or tasks                                          | 17        | 6.1  | 9        | 3.2  |
| Total               |                                                                                                    | 133       | 47.8 | 145      | 52.1 |

Table 2

*Statements made by professors and students*

| Category            | Example Statements                                                                                                                      |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Strategies          | Looked for chunks to grab onto and compared with other texts<br>Looked critically at the articles and paid attention to their logic     |
| Main Ideas          | Looked for the gist of the article<br>Just tried to understand what the argument was about                                              |
| Terminology         | The acronyms were confusing<br>Focus on unfamiliar words                                                                                |
| Personal Background | Drew from personal experience and used that as a base for evaluation<br>Tried to connect with personal opinions and looked for examples |
| Citations           | Remembered specific names from citations<br>Looked at the number and variety of the citations and a statement that stood out            |
| Commentary          | One sentence seemed odd syntactically<br>Felt that it was poorly written and did not have a lot of meaning                              |

### Self-perceptions of Reading Differences by Reading Purpose

When we divided these comments by task purpose, we found other patterns of differences (see Table 3). For instance, more professors than students reported strategies during the synthesis task; however, the participant groups had a similar number of strategies in the synthesis task. Across purposes, students consistently reported looking more often for main ideas than professors did, though there was less discrepancy between the two groups in the analysis task. Professors only made

terminology and citation observations during the analysis and synthesis tasks, while students reported these observations in all tasks. We found one pattern especially interesting in the area of commentary: Both students and professors commented on the difficulty of the synthesis task, though we found that students were more likely to blame themselves for task difficulty (e.g., “I’m not sure I understood the text”) compared to professors who more often blamed the text (e.g., “The paragraph was poorly written, so I struggled to understand it”).

Table 3

*Self-reported reading approaches across tasks by professors and students*

| Strategies          | Summary   |      |          |      | Analysis  |    |          |    | Synthesis |      |          |      |
|---------------------|-----------|------|----------|------|-----------|----|----------|----|-----------|------|----------|------|
|                     | Professor |      | Student  |      | Professor |    | Student  |    | Professor |      | Student  |      |
|                     | <i>n</i>  | %    | <i>n</i> | %    | <i>n</i>  | %  | <i>n</i> | %  | <i>n</i>  | %    | <i>n</i> | %    |
| Strategies          | 15        | 19.7 | 9        | 11.8 | 21        | 21 | 18       | 18 | 16        | 15.7 | 16       | 15.7 |
| Main Ideas          | 13        | 17.1 | 22       | 28.9 | 12        | 12 | 16       | 16 | 9         | 8.8  | 19       | 18.6 |
| Terminology         | 0         | 0    | 5        | 6.5  | 3         | 3  | 4        | 4  | 9         | 8.8  | 8        | 7.8  |
| Personal Background | 6         | 7.8  | 3        | 3.9  | 5         | 5  | 3        | 3  | 1         | 0.9  | 2        | 1.9  |
| Citations           | 0         | 0    | 3        | 3.9  | 4         | 4  | 5        | 5  | 2         | 1.9  | 3        | 2.9  |
| Commentary          | 0         | 0    | 0        | 0    | 9         | 9  | 0        | 0  | 8         | 7.8  | 9        | 8.8  |
| Total               | 34        | 44.7 | 42       | 55.2 | 54        | 54 | 46       | 46 | 45        | 44.1 | 57       | 55.8 |

### Discussion and Conclusions

Reflective interview results showed some reported differences in how professors and students read academic texts. As stated earlier, professors tended to report more strategy usage than students, while students reported focusing more on main ideas. That is, professors reported more and different kinds of activities (what we considered strategies) that contributed to their task performance. It is likely that professors were more experienced academic readers and more aware of their strategies than students, a finding that appears regularly in the literature (Bazerman, 1985; Leinhardt & Young, 1996; Roig, 1999; Sheorey & Mokhtari, 2001; Zhang, 2002). It may also be that students reported focusing on main ideas as a reading strategy because it is a common and valuable academic reading skill and one that is emphasized as a college reading technique (Springer et al, 2014).

When taken as a group without regard to expert or novice status, participants showed some differences in their reported reading approaches based on the task they were asked to perform, which corroborates previous self-report research (e.g., Anderson, 1991; Block, 1992; Madhumathi & Ghosh, 2012; Reynolds

& Rush, 2017; Zhang, 2002). For instance, participants were more likely to report looking for main ideas when reading for summary than synthesis. They were also more likely to draw upon their personal background to understand the summary tasks compared to synthesis tasks and offer evaluative commentary on the difficulty of a task for analysis and synthesis compared to summary.

Interestingly, we did not see a difference in participants' reported citation reading across tasks as was predicted by the eye-movement measures from previous studies (Kunze et al., 2013), including the broader eye-tracking that generated our current data (Eckstein et al., 2020). This lack of difference is likely because participants were not especially cognizant of their citation reading and would understandably have difficulty distinguishing the time they spent on citations across tasks. When asked if they thought professors or students would read citations more carefully, no obvious consensus emerged among participants. These results suggest that while actual eye-movement differences across tasks might be modified by strategy use or attention to main ideas (Eckstein et al., 2020), professors and students found it especially difficult to articulate their citation reading

experiences.

In summary, this research intended to explore whether the self-perceptions of novice (graduate student) and skilled (professor) readers differed while approaching unfamiliar academic writing for different purposes and whether task purposes impacted the self-perceptions of their reading behavior. The reflective data showed different results from those of the broader study (Eckstein et al., 2020) in which no difference in eye-movement behavior was observed across different task purposes. Instead, the present findings are consistent with previous studies which showed that reading purposes do indeed impact reading approaches across tasks (Kunze et al., 2013; Linderholm & Wilde, 2010; Liu et al., 2010; Zhang & Duke, 2008). Moreover, we found that expert readers showed more strategy usage while reading; this echoed previous studies which showed that reading proficiency impacts reading approaches (Bazerman, 1985; Leinhardt & Young, 1996; Roig, 1999; Sheorey & Mokhtari, 2001). Readers of different skill levels adopted different approaches to encountering texts for different task purposes.

This study suggests that readers approach texts differently depending on their skill levels and task purposes.

### **Implications and Limitations**

During the post-reading interviews, professors and students both commented on the difficulty of the synthesis task; however, as mentioned earlier, they differed in their perceptions of the locus of control for this activity, with professors blaming the poorly written text and students placing the locus of control within themselves. Some pedagogical implications are that teachers should help students recognize that strategies they use are or can be effective and can help them build confidence in strategy usage. This way, they will be less likely to underestimate their own abilities or become discouraged while reading difficult passages.

One limitation of this study is that only

one pair of paragraphs (two texts) was used for each task purpose, an amount which might not be enough to fully draw out the effect of the purpose on readers' behavior. Also, each topic (i.e., education technology) was used only for a single specific task purpose (i.e., summarizing). Thus, there might be a possibility that the text and topic combination affected reading behavior, though we tried to mitigate this effect by randomly presenting the combinations for each reader. Another noteworthy point is that no standardized summary, analysis, and synthesis definitions were provided to participants; instead, researchers relied on participants' preconceived ideas of what these tasks meant. Though we were confident that participants were familiar with the tasks and had had experience engaging in them throughout their studies and professions, it is possible that participants' understandings differed slightly, affecting the study results.

A more robust approach to a future study might only recruit students and professors from the same department or program. Participants might also read two pairs of paragraphs (four texts total) for each task so that their eye movement would be recorded while reading more paragraphs. During the practice-guided task, readers might be given sample responses for a summary, analysis, and synthesis. This way, they would have a more standardized understanding of what the tasks meant and how they were expected to approach them.

It is possible that some participants, particularly among the professors, had more background knowledge about the passages and topics than others. Although this could influence how participants approached the text and thus be a limitation of this study, it is not one we were particularly concerned with measuring. When participants were asked informally about their familiarity with the topics, only one participant expressed having any particular specialization in the subject areas of the passages.

The combined results of this research suggested that task purposes and proficiency

levels affect how readers approach the text. To help novices become more experienced readers, teachers can explicitly teach students to be more aware of their strategy usage. Some scaffolding (i.e., guided practice) may be needed. In addition, it is essential to note that

reading purpose plays an important role in how students interact with the text. Therefore, teachers should take care to prepare students to engage with reading in ways that will support their various reading purposes.

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## APPENDIX A

### Priming Text Procedures and Reflective Interview Questions

#### A. Priming Text Procedures

You will read six paragraphs in three sets of two. The paragraphs are taken from published academic articles, so the writing is dense and contains citations in APA format. Once you've read a paragraph and moved on, you won't be able to go back, so feel free to read each paragraph as many times as you need to comprehend the information. After every other paragraph, you will be asked to discuss the paired paragraphs with a researcher. To help prepare you for the readings, here are the topics of the three paragraph sets you'll see today. They will appear in random order.

- 1) Educational Technology in higher education (Summarize)  
Educational technology (aka EdTech) is a multi-billion dollar industry focused on making education better through technological innovation. It includes staples like Google Docs and Dropbox as well as games, virtual reality, and online classes. Obviously the EdTech revolution is here, but the question is whether and how to use it to improve teaching at the college level.
  - What is your opinion on the possibilities and limitations of EdTech?
- 2) Entrepreneurship education (Analyze)  
In the age of lucrative start-ups thanks to Silicon Valley and new market innovation, colleges and universities are no longer just preparing students for a vocation but to think as entrepreneurs. The question, then, is how universities and educators can incorporate an entrepreneurship design.
  - What is your opinion on possibilities and limitations of entrepreneurship education in college?
- 3) Technological affordances in education (Synthesize)  
Technological affordances can be thought of as the features of a piece of technology; the features of a cell phone, the features of a database, the features of a tweet. Every technological affordance also has constraints: a fix number of characters per tweet. Do the benefits of technology outweigh their constraints for learning in the classroom?
  - What is your opinion on the possibilities and limitations of technology for learning?

#### B. Reflective Interview Questions

1. What did you focus on or think about during the following reading/writing tasks?
  - a. Comprehension
  - b. Evaluation
  - c. Synthesis
2. What did you do when you came to the citations in each reading?
3. How did the citations influence your reading?
4. What are the differences in the way you read academic text/citations in your own field vs. an unfamiliar field?
5. Do you think there are any differences in the way you and your professors/students read academic writing, specifically citations?

## APPENDIX B

### Text Passages

#### **Text 1: Educational Technology in Higher Education**

Over the last 25 years, educational technology (Edtech) in Higher Education (HE) has been promoted as having the potential to transform teaching and learning. Even so, there is little evidence of the long promised revolution in HE facilitated by Edtech. Selwyn (2007) suggests there is a growing need for educational research to account for the distinct ‘digital disconnect’ between the enthusiastic rhetoric and rather uninspiring reality of university Edtech use. Others expand that need to developing strategies for facilitating the implementation of Edtech in HE to enhance student learning (Ertmer & Ottenbreit-Leftwich, 2013). A critical factor in the successful implementation of Edtech in HE has been identified as the competence of teachers to know why, when and how best to implement educational technologies (Krumsvik, 2014; Laurillard & Masterman, 2009; Lindberg & Olofsson, 2012; Schneckenberg, 2009, 2010). The adoption of Edtech by teachers is, however, a complex process influenced by many factors both extrinsic and intrinsic (Drent & Meelissen, 2008). Somekh (2008) advocates that research should focus on how teachers use technology; however, Kirkwood (2009) proposes that the consideration of more fundamental questions such as teachers’ conceptions of and approaches to teaching and learning with Edtech is missing. There is a need to research change and development in teachers’ conceptions of and approaches to the use of Edtech over time if the relatively ineffectual implementation of Edtech is to be remedied (Kim, Kim, Lee, Spector, & DeMeester, 2013).

#### **Text 2: Conceptions and Approaches in Educational Technology**

Although conceptions and approaches are defined by Kember (2009) as separate aspects of teaching, these two concepts are theoretically closely aligned. Trigwell and Prosser (1996) argue that teachers’ approaches to teaching correspond to their conceptions of teaching, which in turn relate to their conceptions of learning. In this study, the more discernible changes in approach are seen as indicative of a corresponding change in conceptions of teaching with Edtech. Approaches to using Edtech in teaching and learning have been found to be underpinned by conceptions of technology use in education, conceptions of teaching and learning and perceptions of the technological teaching context (Song & Looi, 2012). Thus, how teachers conceptualise Edtech and the role of teaching has a significant impact on how they utilise technology in their teaching practice. The concept of a ‘teaching approach’ is used varyingly with some researchers seeing it as relatively stable (Kember & Kwan, 2000), while others agree that context affects teaching approaches (Fanghanel & Trowler, 2008; Prosser & Trigwell, 1999; Glassett & Schrum, 2009; Somekh, 2008). A student-centred approach is consistently viewed as more sophisticated than a teacher-centred approach (Kember & Gow, 1994), and is considered to be necessary for the successful integration of Edtech. Trigwell and colleagues (1994) identified five qualitatively different approaches to teaching (A to E) that are structurally related in a hierarchy of inclusiveness, ranging from information transmission to facilitating learning through conceptual change. The consequences of these differing approaches lie in the manner in which they influence how technology is used to facilitate learning.

#### **Text 3: Themes in Entrepreneurship Education—How to Succeed in Business Teaching**

Systematic analysis of the different themes within entrepreneurship education highlights that enabling an understanding of entrepreneurship, enhancing graduate employability and encouraging graduate enterprise are the three distinct outcomes of entrepreneurship education (Pittaway and Cope, 2007; Hindle, 2007; Fayolle and Gailly, 2008; Rae, 2010; Seikkula-Leino et al., 2010; Gilbert, 2012; Huq and Gilbert, 2013). Such analysis further postulates that “debates about entrepreneurship pedagogy sit within the context of what entrepreneurship education is understood to ‘mean’ [...] axioms that are themselves guided by contextual factors (Kearney, 1994). It is also inevitable that these contextual factors are further influenced by the wider society and particularly its culture” (Pittaway and Cope, 2007, p. 485). According to Anderson and Jack (2008), the ontological dimension of a teaching model for entrepreneurship education requires a clear definition of entrepreneurship as a teaching field and what Gibb (2002) calls “education” means for educators and students within the entrepreneurship context. While there is little debate about these expectations within the domain of entrepreneurship education, it is important to recognise that its outputs cannot be delivered by

a “one size fits all” approach to entrepreneurship pedagogy, as argued by Hannon (2006). They are the collective result of various learning approaches within the entire entrepreneurship programme experience where graduate attributes are systematically and progressively developed through well-designed curricula. The success of such a programme calls for educators in foundational entrepreneurship courses to adopt learner-centred teaching skills and strategies that support students not only to achieve a successful academic and social transition to higher education (Parker et al., 2004), but also to develop a sense of ownership of their learning while building a community of learning.

#### **Text 4: Teaching General Entrepreneurial Skills in Universities**

Stanford University’s contribution to the development of Silicon Valley that led to what has been described as “inventing the entrepreneurial university” calls for universities to harness increased collaboration with industry, particularly since both federal and state funding is being cut to support the operation of the university (Nelson et al., 2001). A range of studies that explore how universities can act in “entrepreneurial” ways including those that argue that universities are already at the forefront of innovation and hence should act entrepreneurially (Conceicao and Heitor, 2002; Jacob et al., 2003; Shane, 2004; Pittaway and Cope, 2007) and encourage academic entrepreneurship as suggested by Jackman (2009). Despite this general consensus around the context in which entrepreneurship education takes place, business schools are still being criticised for their “persistent deficiencies in certain non-technical graduate skills” (Jackson and Chapman, 2012, p. 96). Crebert (2002) argues that outdated curricula, inappropriate pedagogical techniques and inadequate opportunities for work-integrated learning are some of the major reasons for such deficiencies. As captured in its founding motto dating back to 1887 – “A skilled hand, a cultivated mind”, RMIT University has maintained its strong commitment towards making a significant contribution to graduates’ work and industry readiness, specifically the development of the core skills and capabilities of practice (RMIT WIL Policy, 2007). Following a series of high-level workshops and staff consultations, RMIT (2015) declared that its 2015 Strategic Plan was to combine teaching, research and partnerships to create value in the global economy, support enterprise, and serve the needs of diverse communities.

#### **Text 5: Bring Your Own Device—Learning Technology (Affordances) from Teachers’ Perspectives**

Gibson (1979) defines affordances as the possible features that the environment can offer for the observer for action. Salomon (1993) interprets Gibson's concept of affordances as “the perceived and actual properties of a thing, primarily those functional properties that determine just how the thing could possibly be used” (p. 51). However, others maintain that Gibson's concept of affordances is constrained to human and natural environment relationships, and cannot go beyond that scope to address the technology affordances in human-computer interactions (Kaptelinin & Nardi, 2012). Thus, Kaptelinin and Nardi (2012) propose understanding technology affordances from a social-cultural perspective as “possibilities for mediated human action (p. 975)” because human actions and mind are mediated by tools, including the technology tools people use. Based on this definition of technology affordances, in this paper, the authors define affordances of BYOD as “possibilities of adopting BYOD for mediated pedagogical practices” where pedagogical practices refer to teaching and learning activities. The concept of technology affordances has also been used in the area of information communications technology (ICT) including mobile technology applications in education to explore the possibilities that educational technologies provide for students in ICT-rich learning environments (e.g., Churchill, Lu, & Chiu, 2014; Klopfer & Squire, 2008; Song, 2011). Affordances of mobile technologies have been used in a variety of learning activities; however, the majority of the studies have either explored the affordances of designed tools on mobile devices for learning (e.g., Dennen & Hao, 2014) or affordances of mobile devices from student perspectives (e.g., Song, 2011).

#### **Text 6: Benefits and Drawbacks of Technological Affordances in the Classroom**

Gibson (1979) maintains that some affordances of the environment are beneficial and some are harmful. “Any one [technology] affordance can be considered to have both positive and negative connotations” (Conole & Dyke, 2004, p. 113). For instance, SMS can be used to send a message, but it can also limit the sending process if the message is a long text. Thus, Conole and Dyke (2004) argue that the affordance of a technology does not simply contribute to the intended use but can also result in unintended consequences such as fragility in digital technologies and networks that lead to abuses, to disruption from viruses and SPAM, or simply to the servers “being down”. The affordances of ICT may not be exploited

effectively without coping with these barriers Lier (2004). From the perspective of a designer, Norman (1998) points out three categories of action constraints of technologies. They are: (1) physical constraints (the features of the technology); (2) logical constraints (the operation of the technology system) and (3) cultural constraints (the way the technologies are used according to conventions shared by a cultural group). Physical and logical constraints are all concerned with the device itself, thus can be considered technical constraints. In addition, cultural constraints should be addressed in a wider scope to include broader social aspects such as institutional, and community factors (Jonassen, Howland, Marra, & Crismond, 2008; Song, 2011; Fisher, 2008; Plummer, 2009). Finally, the user's personal factors may also constitute a type of constraint in perceiving and acting on the affordances to achieve certain learning goals due to learners' different abilities and needs (Song 2013).

# *Increasing the Literacy Abilities of Developmental College Students through Integrated Orthographic Instruction*

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## **ABSTRACT**

*The purpose of this parallel mixed-methods study was to assess the impact of integrated orthographic instruction (IOI) on developmental college readers' morphological awareness and reading comprehension. To further interpret and contextualize that data, we qualitatively explored students' experiences with IOI. Before and after the target instruction, three morphological awareness instruments were administered to 38 participants, and one comprehension measure was administered to 16 of those students. Paired-samples *t* tests revealed a significant difference in pre- and post-intervention Accuplacer Reading scores and DMORPH scores, demonstrating gains in comprehension and derived morphology, respectively. Qualitatively, analysis of students' reflections on learning revealed several themes that support the inclusion of IOI in developmental reading. Results indicate that the orthographic complexity of the language did not deter literacy growth; rather, it yielded a deeper understanding of the language and motivated further learning. Implications for instructional and curricular revisions to developmental college reading programs are discussed.*

*Keywords: developmental reading, integrated orthographic instruction, etymology, morphology*

*I was afraid of making a mistake in my pronunciation*

*and that if someone was listening as I read they would*

*make fun of me. This is what I am afraid of and it is a negative influence that prevents me from moving forward. (Trexler, 2021, p. 129)*

## Introduction

The above quote from a student entering developmental college reading reveals how insecurities and fear obstruct her literacy progression, as does her overemphasis on one dimension of English orthography—phonology. These hindrances are not uncommon, as 30% of students in a recent study of developmental college readers also associated negative emotions with reading and 70% isolated phonology over morphology and etymology (Trexler, 2021). While negative emotions can prevent students' literacy growth, prioritizing one dimension in a multidimensional language like English is equally problematic because English orthography embodies morphology, etymology, and phonology as well as orthographic conventions (Bowers & Bowers, 2017; Vacheck, 1989; Venezky, 1999). Consequently, reliance on phonology misdirects students' concept of reading from a meaning making process to an exercise in pronouncing words quickly and correctly (Trexler, 2021).

Reductionistic notions of reading indicate that primary and secondary literacy instruction has not fully prepared students for college and citizenship reading (Common Core State Standards Initiative, 2021, p. 2). In fact, nearly 30% of the 5.4 million students in public two-year higher education institutions were placed into developmental English/reading courses in 2019 (Center for the Analysis of Postsecondary Readiness, 2021; Community College Research Center, 2021). Designation for developmental reading is widely determined by the College Board's Accuplacer Next Generation placement test (College Board, 2021). According to the College Board (2017), the lowest range of scores correlates to a fourth-grade level. Low reading levels are further complicated by the increased “reading

demands” of semantically and syntactically complex materials in both higher education and citizenship texts. As a result, for many students, a gap exists between their reading abilities and the literacy demands required of them in their postsecondary pursuits.

While this literacy gap precedes students' entry into higher education, developmental reading programs have faced challenges in closing it, as evidenced by poor retention and completion rates. In response to these challenges, colleges have embraced a range of reform efforts, such as corequisite courses and multiple pathways, which have yielded greater innovation than the “poorly designed and implemented remedial programs” (Boylan & Trawick, 2013, p. 31) that elicited widespread critique. Some of these reforms have provided students with valuable skills and “shown modest positive effects for students with lower levels of academic preparation in reading and writing courses” (Center for the Analysis of Postsecondary Readiness, 2022). Despite those outcomes, problems in developmental education persist, with national data revealing that 54% of students who test into developmental reading do not complete the entire developmental course sequence (Center for the Analysis of Postsecondary Readiness, 2021). The unproductiveness of developmental programs exacerbates reading difficulties and gaps in college students' knowledge. When compared with their more proficient-reading peers, students in developmental reading courses struggle with oral and written comprehension, reading rate, written word recognition, phonological awareness, and strategic reading (Flink, 2017; Perin, 2013).

The reading difficulties of postsecondary students are similar to those of below-proficient readers in both secondary and adult literacy contexts, where reading struggles have coalesced around vocabulary development, word reading, and reading comprehension (Elleman & Oslund, 2019; Nippold, 2017). More specifically, Pacheco and Goodwin (2015) found that the effectiveness and specific

nature of secondary students' morphological problem-solving strategies was a main distinction between struggling and proficient readers. This distinction is noteworthy, especially when contextualized within Townsend et al.'s (2016) finding that morphological awareness of academic words predicts achievement across the disciplines more closely than general vocabulary measures. Since "morphological awareness represents orthographic, phonological, semantic, and syntactical knowledge," it functions as a sort of "omnibus of word knowledge with specific links to comprehension" (p. 1140). Because English is multidimensional, Townsend et al.'s (2016) supposition regarding morphological awareness acting as a compendium of orthographic word knowledge seems logical. In this article, instruction that incorporates the three orthographic dimensions (morphology, etymology, phonology) and orthographic conventions is referred to as integrated orthographic instruction (IOI). IOI is often overlooked in developmental college reading curricula, which typically focuses on strategies like annotation of texts and concepts such as main ideas and stages of reading (College Board, 2021; Li, 2015; Townsend et al., 2016). Therefore, to assess the impact of IOI on the comprehension and morphological awareness skills of students in developmental college reading and to understand their experiences with IOI, we conducted a parallel mixed methods study. Through our findings, we seek to extend research on IOI among students in developmental college reading.

### **English Orthography**

Etymology, morphology, and phonology represent the three dimensions of English orthography. The intersection of these dimensions has been conceptualized through early linguistic scholars' analysis of the structure and function of the written language (Chomsky, 1970; Venezky, 1999) and through the term morphophonemics (Vachek, 1989; Venezky, 1999). The term morphophonemic describes two dimensions of orthography—

morphology and phonology.

Although morphophonemics has been defined differently across the literature (Chomsky & Halle, 1968; Josiah & Udoudom, 2012; Ping & Liow, 2011), Venezky (1999) concisely theorized that "visual identity of meaningful word parts takes precedence over letter-sound simplicity" (p. 198). Due to the preservation of meaning through visually consistent word parts, the English orthography has been described as an optimal system (Chomsky, 1970; Chomsky & Halle, 1968). For example, the lexical element <vis>, denoting seeing, is visually depicted across related words that undergo phonological changes (e.g., revise, revis(e)ion, vis(e)ion, vis(e)or). These phonological shifts occur consistently and predictably across morphemic (e.g., vision/visor) and grammatical changes (e.g., revise/revision). The consistent lexical spelling allows words like "revise" and "revision" to be recognized as variants of the same lexical content. When related words are recognized as lexical variants, they can be learned as part of the same word family instead of as two separate words; the former method is more efficient, especially considering that the English language continually expands and evolves. In order to take advantage of these linguistic affordances, it is essential to examine written English through instruction that integrates all three orthographic dimensions.

Through various conventions, written English conveys meaning and history to its readers. Meaning is conveyed through structural units called morphemes—prefixes, suffixes, and base elements—as well as through graphemes that function as relational markers. Instead of representing sound, relational markers serve to clarify meaning, whether by differentiating homophones (pleas and please) or signaling relationships between etymologically related words. For example, the spelling of "doubt" might seem senseless for its inclusion of the grapheme <b>, but an orthographic analysis reveals that <b> is a marker signaling its etymological relationship to words like dubious and double, which derive

from the Latin root *dubitare* and share the denotation of “twoness” (Hastings & Trexler, 2021). In this instance, the phonology or pronunciation of the word “doubt” can only be understood through an etymological analysis.

Although etymology is omitted from the term morphophonemic, this example demonstrates that it is represented within the spelling system, serving as a connection to orthographic morphology and phonology. While etymological analysis often reveals a word’s language of origin and linguistic evolution, it can also aid in the identification of morphemes and graphemes within words. For instance, the word *schemer*, meaning one who plots or plans usually in a devious way, derives from a Greek root. This word consists of two morpheme elements: the free base <scheme> with a connotation of planning and the <er> suffix, which creates a noun agent, as in the one doing or planning the scheme. Within the base <scheme>, the digraph <ch> represents the phoneme /k/, which is a common representation in words derived from Greek roots (Venezky, 1999). By exploring a word’s etymology in conjunction with morphology and phonology, integration of English orthography can be realized.

### **Integrated Orthographic Instructional Approaches**

In recognition of the importance of IOI, a subset of practitioners (Bellomo, 2018; Gray et al., 2018; Halford et al., 2022) have developed and studied literacy approaches that include several orthographic dimensions. Other practitioners (Bowers & Kirby, 2010; Colenbrander et al., 2021; Devonshire et al., 2013; Georgiou et al., 2021; Murphy & Diehm, 2020) have taken a more comprehensive approach to IOI through structured word inquiry (SWI). SWI is a process that investigates morphology, etymology, phonology, and spelling conventions through scientific investigation: making observations about a family of words, forming hypotheses, and supporting or falsifying them with evidence (Bowers & Bowers, 2017).

Among the research on IOI and SWI, some researchers have compared these integrated forms of instruction with other literacy approaches. In Devonshire et al.’s (2013) study, they found that SWI outperformed phonics instruction in the areas of general spelling, spelling of morphemes, spelling conventions, and word reading. Similarly, in Bowers and Kirby’s (2010) study of SWI, they determined that elementary students who received orthographic intervention showed greater ability to identify bases within morphologically complex words compared to those in the control group. In contrast, recent comparative studies determined that SWI did not yield more significant gains than alternate forms of instruction, such as *Simplicity* (a phonics program) (Georgiou et al., 2021) or reciprocal teaching with robust vocabulary instruction (Colenbrander, 2021). However, researchers from both studies acknowledged that these SWI interventions were implemented by newly trained paraprofessionals and graduate assistants and greater results could be expected with more experienced instructors.

In addition to comparative studies, SWI has been examined for its impact on the literacy skills of elementary age readers. In these studies, there was an increase in students’ vocabulary development (Bowers & Kirby, 2010), word reading abilities (Devonshire et al., 2013; Murphy & Diehm, 2020), understanding of morphological relationships (Devonshire & Fluck, 2010; Georgiou et al., 2021), and spelling (Colenbrander et al., 2021; Devonshire et al., 2013; Murphy & Diehm, 2020).

SWI has been effective for general or mixed ability elementary students and those students with underdeveloped literacy skills. For instance, Georgiou et al. (2021) found that SWI resulted in significant gains in word reading and morphological relatedness for struggling third grade readers. Similarly, Colenbrander et al. (2021) found evidence that SWI supported the transfer of spelling abilities to untaught words “for poor readers and spellers” in third grade (p. 307). Spelling gains

have also been found by Murphy and Diehm (2021) for first through fourth grade “children with word-level reading and spelling difficulties” (p. 544). These findings provide support for the inclusion of morphological and etymological instruction for all early elementary students.

### **Impact on Adult Readers**

The impact of IOI extends beyond the essential literacy skills of elementary school students, as demonstrated by Trexler (2021). ). At the college level, IOI, specifically in the form of SWI, has been shown to impact students’ literacy development through their self-efficacy and strategy use. In Trexler’s study of more than 130 developmental college students, pre-intervention data revealed that 70% of students primarily relied on phonology and only 9.3% and 2.5% utilized morphology and etymology, respectively, within their reading strategies. However, after one semester of SWI instruction, 44% of students began applying morphology or etymology within reading tasks. While this finding shows a significant shift in students’ strategic reading, it is uncertain whether that change extends to other measures of reading proficiency, such as morphological awareness and comprehension.

Other studies (Bellomo, 2018; Gray et al., 2018) of IOI, not utilizing SWI, among adult readers, have demonstrated an increase in word reading. As Gray et al. (2018) found in their study with adults earning their GED, literacy instruction that takes a morphophonemic approach is more effective than whole word study at producing word reading skills among “adult struggling readers” (p. 92). This finding coincides with and expands upon earlier research from Bellomo (2018), who found that one semester of morphological and etymological instruction among developmental community college students resulted in greater gains in both vocabulary and word-part recognition. These gains could be explained by morphemes’ “mnemonic value” as they “deepen associations and facilitate recall” (Bellomo,

2018, p. 41).

In summary, although IOI has improved morphological awareness among adult readers and SWI has been shown to support elementary age readers in the areas of vocabulary, word reading skills, and morphological relationships, the impact of SWI on adults’ morphological awareness and reading comprehension still needs to be explored among students within developmental reading.

### **Theoretical Framework**

The Critical Inquiry (CI) framework (Hastings & Trexler, 2021) that guides this study is a synthesis of two perspectives: SWI (Bowers & Kirby, 2010) and critical literacy (Lewinson et al., 2002). Neither SWI nor critical literacy is a set curriculum; rather, both are approaches that can yield deeper understandings of language, literacy, and the world. Critical literacy is an ideological stance that acknowledges that texts and practices are not neutral, natural, or complete; thus, students must be prepared to observe, critique, and utilize literacy skills to address problems in their environments (Freire, 2008). Likewise, through inquiry and engagement, SWI offers a linguistic process for investigating written English and expanding the meaning that is derived from it.

The CI framework foregrounds the way in which orthographic learning can, by itself, function as a transformative act (Hastings & Trexler, 2021). Critical literacy practices support students in reading “the word and the world” (Freire, 2008, iv). Here, “reading the word” refers to students’ ability to interpret English orthography through morphology, etymology, and phonology; multiple dimensions are essential to understanding the written English language (Hastings & Trexler, 2021). Isolation or exclusion of any one dimension obscures the logic behind the spelling system, thereby limiting students’ meaning-making. By contrast, when multiple dimensions are

explored in connection to one another, the orthographic system becomes coherent.

Within the broader level of the CI framework, “reading the world” alludes to the way that students can utilize their deeper understanding of the written language towards transformative ends. In the process of “reading the world,” multiplicity plays an essential role; it supports ideological awareness that texts represent particular points of view, and as such, should be read and analyzed to determine whose views are present and whose are absent. Central to this practice is the recognition that the more viewpoints one understands about an issue, the more deeply one can understand the issue itself (Freebody & Luke, 1990; Lewinson et al., 2002).

The purposeful generation of multiplicity, which is one of five practices (see Appendix A for a description of all five practices) within the CI theoretical framework, was especially salient in guiding the present study on two levels: (a) it informed the target intervention through the authors’ open access book and instruction, and (b) it guided the analysis of qualitative data.

### **Current Study**

The purpose of this mixed methods study was to quantitatively investigate whether IOI enhanced developmental college students’ morphological awareness and reading comprehension. To further interpret quantitative findings, we qualitatively explored students’ descriptions of their experiences with IOI. A convergent parallel design allowed us to collect quantitative and qualitative data concurrently (Cresswell & Plano Clark, 2011). After both data sets were analyzed independently, we interpreted the data together to capture the depth and breadth of IOI.

To this end, the study addressed three research questions:

1. Does a semester of IOI have a significant effect on students’ Accuplacer Next Generation reading score?
2. Does a semester of IOI have a significant effect on students’ morphological

awareness?

- 3). How do students describe their experiences with IOI and do these experiences augment the quantitative findings from RQ 1 and 2?

## **Method**

### **Participants**

The participants included 38 developmental reading students enrolled in four sections of Reading II at a community college in the northeast region of the United States. Upon registration at the college, students were administered the Accuplacer Next Generation placement exam. Those who score in the range of 231-250 are required to take Reading II, a developmental-level reading course, before registering for 100-level classes. Reading II is designed to focus on elements of reading such as comprehension, language clues, structural clues, critical thinking, and strategic reading. Among the four sections included in this study, two sections were 16-week courses (one taught by Hastings and one co-taught by Hastings and Trexler ) and two sections were accelerated 7-week courses (both taught by Trexler ). The sample consisted of 76% females and included an age range from 18-57. Through a self-reported survey, the participants indicated that they represented a range of linguistic backgrounds, including English, Spanish, French, Arabic, Creole, Krio, and American Sign Language. Other characteristics of the sample were consistent with the broader demographics of the college.

### **Instructional Context**

The IOI that students received as part of this study was facilitated by Trexler and Hasting’s open access guidebook, which was created through the CI framework ( [https://human.libretexts.org/Courses/Delaware\\_County\\_Community\\_College/Cultivating\\_Possibilities\\_through\\_LiteracyWithin](https://human.libretexts.org/Courses/Delaware_County_Community_College/Cultivating_Possibilities_through_LiteracyWithin) the classroom instruction and throughout the guidebook, students regularly formed observations about the orthography, developed and conducted inquiries into

relevant words from their reading materials, and challenged their assumptions about the English language and their own reading practices.

Within their orthographic inquiries, students explored all three dimensions of the language, often beginning by articulating a word's sense and meaning. Next, by utilizing Etymonline, students investigated a word's history, including its language of origin and other languages that may have influenced its spelling. Students traced the evolution of a word's connotation and discovered its orthographic denotation. Having identified a root and denotation, students identified word relatives that derived from the same root and differentiated words that were morphologically or etymologically related. These word families provided evidence that students could use to confirm or falsify their hypotheses regarding morphemic elements such as bases, prefixes, and suffixes. Lastly, students examined phonology within morphological families and used the International Phonetic Association's (IPA) alphabet to sort words based on vowel and consonant alternations (See Appendix B for a detailed example of this approach.)

## Measures

A series of three morphological awareness assessments and one reading comprehension assessment were group administered. The morphological awareness instruments were adapted from previous work with struggling adult readers (Tighe, 2019; Tighe & Schatschneider, 2015;) and are being developed as part of an ongoing grant. Previous studies with struggling adult readers report excellent reliability estimates with these assessments (Cronbach's alphas of .75-.90; Tighe & Schatschneider, 2015). The morphological assessments were administered untimed and each assessment targeted a form of morphological awareness, including derivational morphology, conjugation of irregular verbs, and identification of morphemic elements within words.

## *Morphological Awareness Instruments*

**Derived Form Morphology (DMORPH) Task.** In this assessment, the participant is tasked with filling in a sentence blank by transforming words into derived morphological forms (e.g., "Fog. The weather outside was \_\_\_\_."; "Foggy."). Each participant received 20 items.

**Morphological Analogy Task (Irregular).** In this assessment, the participant is asked to follow an analogy structure of morphological word pairs (A:B :: C:D) to fill in "D", either an irregular past tense inflectional word form or present tense base word (e.g., "Walked : Walk :: Kept : \_\_\_\_."; "Keep."). The participant completed 14 items.

**Morphological Skill Task.** In this assessment, the participant is asked to assess morphological relatedness by selecting from three answer choices the word that "comes from" a complex word (e.g., "Industrialize"; "a. industry, b. dust, c. trial."). The participant completed 17 items.

## *Reading Comprehension: Accuplacer Next Generation Placement Exam*

The Accuplacer Next Generation Placement Exam is a broad-spectrum test that assesses college students' readiness for credit-bearing courses in key disciplines. The reading subtest focuses on four main areas: rhetoric, vocabulary, synthesis, and information and ideas (College Board, 2017). Through a combination of individual and paired texts, both authentic and test-commissioned, as well as corresponding multiple-choice questions, the Accuplacer measures students' ability to derive meaning from passages and determine the meaning of words in short and extended contexts. This untimed, computer-adaptive test is individually administered upon registration at the college. All 16 students from the class that was co-taught by Trexler and

Hastings were administered the Accuplacer twice—prior to the start of the Fall 2021 semester and again at the end of the semester. Both rounds of testing were conducted by the

college's Assessment Center. Due to Covid-19 restrictions, there were constraints to the availability and capacity of the Assessment Center, thereby allowing only one class to retake the Accuplacer.

## Results

## Correlations

Prior to running our quantitative analyses (research questions 1 and 2), we examined correlations among all pre- and post-intervention morphological assessment scores and Accuplacer Reading scores. As expected, most correlations were positive; however, post morphological skill scores were negatively, but not significantly, associated with pre- and post-intervention Accuplacer Reading scores ( $r_s = -.407, -.156$ ,  $p_s = .189, .628$  respectively; see Table 1).

Table 1  
Correlations among Pre- and Post-Intervention Assessments

| Variable              | 1  | 2      | 3     | 4      | 5      | 6      | 7      | 8     |
|-----------------------|----|--------|-------|--------|--------|--------|--------|-------|
| 1. Pre-DMORPH         | -- | .495** | .359* | .771** | .601** | .493** | .375*  | .545  |
| 2. Pre-Morph Analogy  | -- | --     | .291  | .641*  | .401*  | .782** | .177   | .434  |
| 3. Pre-Morph Skill    | -- | --     | --    | .485   | .242   | .437** | .378*  | .329  |
| 4. Pre-Accuplacer     | -- | --     | --    | --     | .499   | .529   | .407   | .586* |
| 5. Post-DMORPH        | -- | --     | --    | --     | --     | .217   | .062   | .502  |
| 6. Post-Morph Analogy | -- | --     | --    | --     | --     | --     | .483** | .459  |
| 7. Post-Morph Skill   | -- | --     | --    | --     | --     | --     | --     | -.156 |
| 8. Post-Accuplacer    | -- | --     | --    | --     | --     | --     | --     | --    |

Note. Ns range from 12-38.

\* $p < .05$

\*\* $p < .0$

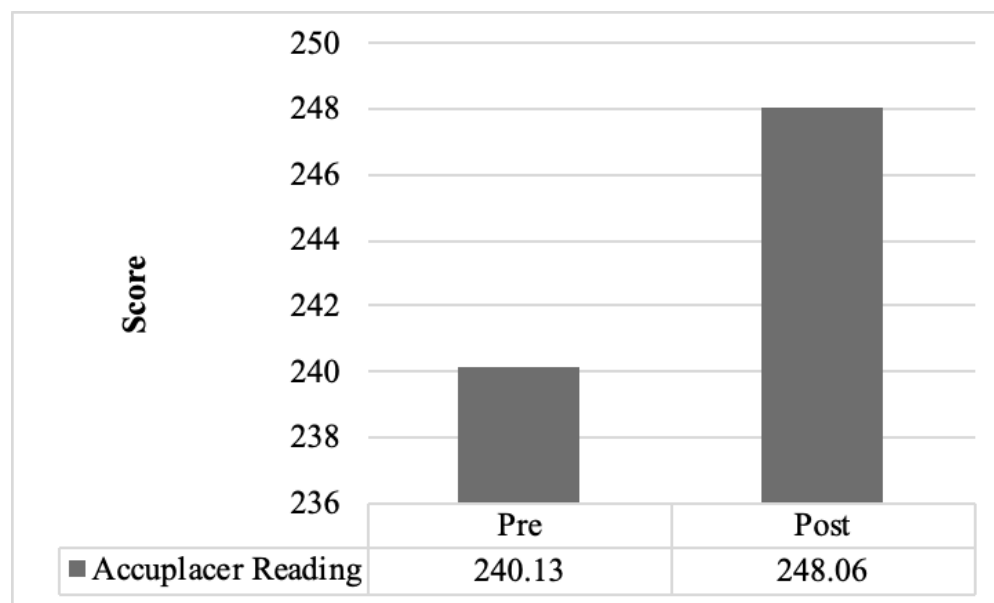
## Research Question 1

To address RQ1, we conducted a paired samples t-test to investigate pre- and post-intervention Accuplacer Reading scores

on the full sample available ( $N = 16$ ). There was a significant difference in pre- ( $M = 240.13$ ,  $SD = 7.47$ ) and post-intervention Accuplacer Reading scores ( $M = 248.06$ ,  $SD = 12.24$ ;  $t[15] = 3.16$ ,  $p = .007$ ; Figure 1).

**Figure 1**

*Pre- and Post-Intervention Accuplacer Reading Scores*



*Note.* Students' average pre- and post-intervention scores on the Accuplacer reading comprehension test.

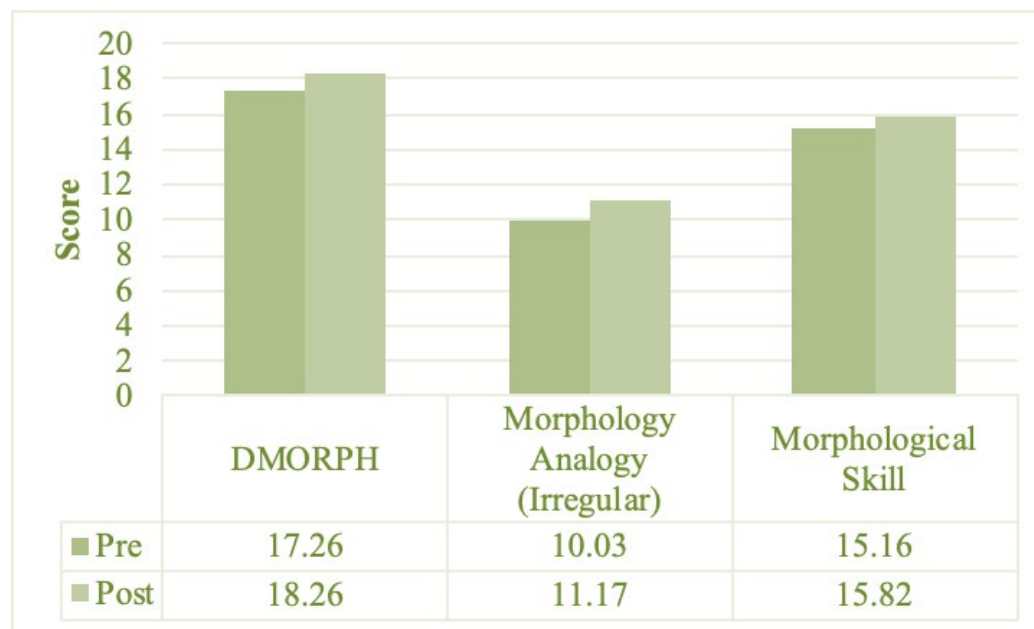
### **Research Question 2**

To address RQ2, we ran three paired samples t-tests to examine pre- and post-intervention scores on the three morphological awareness measures (DMORPH, Analogy, and Skill) on the full sample available ( $N = 38$ ). For the DMORPH, there was a significant difference in pre- ( $M = 17.26$ ,  $SD = 2.83$ ) and post-intervention scores ( $M = 18.26$ ,  $SD = 2.81$ ;  $t[37] = 2.45$ ,  $p = .019$ ). For the Morphological

Analogy Task, there was also a significant difference in pre- ( $M = 10.01$ ,  $SD = 4.48$ ) and post-intervention scores ( $M = 11.71$ ,  $SD = 3.10$ ;  $t[37] = 3.68$ ,  $p = .001$ ). For the Morphological Skill Task, there was not a significant difference in pre- ( $M = 15.16$ ,  $SD = 2.49$ ) and post-intervention scores ( $M = 15.82$ ,  $SD = 1.98$ ;  $t[37] = 1.60$ ,  $p = .117$ ; Figure 2). For all significant effects, the direction was higher at post-intervention, as expected.

**Figure 2**

*Pre- and Post-Intervention Morphology Assessment Scores*



*Note.* Students' pre-and post-intervention scores on the three morphological assessments.

### Qualitative Findings

Qualitative data was simultaneously collected with quantitative measures through a pre-course survey. Throughout the course, students reflected on readings, assignments, and class activities. At the culmination of the semester, they reviewed course materials and articulated the most significant aspects of their experience with IOI. Intentionally open-ended, this assignment allowed students to describe their engagement with course concepts and materials in whichever way was meaningful to them.

### Data Analysis

Following the analysis of quantitative data, qualitative results from student surveys and reflections were analyzed to interpret and

further contextualize the quantitative findings. Qualitative data analysis included two rounds of coding that captured the essence of students' experiences of IOI. In the first round of inductive open coding, we individually read students' reflective texts and wrote analytic memos that noted specific phrases that reappeared throughout the reflections. In accordance with In Vivo coding, our memos preserved students' own language as a way of prioritizing participants' voices (Miles et al., 2020). After individually coding the same data set, we compared first-round codes and memos to establish intercoder reliability and consolidate codes. This process also allowed conflicting interpretations to be worked out. Collaboratively, we engaged in a second round of coding, which focused on reconfiguring codes in relation to one another and, by

extension, formulating themes and subthemes that described participants' lived experiences of IOI.

### **Research Question 3**

In the following section, we present the findings from our qualitative analysis of students' (identified here by pseudonyms) reflections. Each of the major themes outlined below have varying degrees of support, but when examined across the entire data sample, they represent salient aspects of students' experiences.

#### ***Expanded Conceptual Understanding of Reading***

In students' reflections on learning through IOI, they expressed that reading was more than they thought or expected when the course began. Entering the course, students' concepts of reading were closely connected to reading books and writing accompanying essays, especially as a demonstration of comprehension. While these tasks featured prominently in their expectations, students did not anticipate the study of morphology and etymology. Consequently, the integration of all three orthographic dimensions within the scope of the course surprised them, as Aaliyah noted:

I said well since it is a reading class we are just going to be reading and writing. However, it was much more than that. I was taught things I never thought were necessary. Although, I do see an increase in my knowledge. I was honestly surprised by the things we were taught such as all the word terms and the ways to analyze them.

Aaliyah's expectation that she was just going to read and write was echoed through other reflections, such as Morgan's: "When I started this class my expectations were that it would be just like High School when I was asked to read a book and relay the information I read by telling you what the book was about." Morgan's emphasis on "relaying" information

from books reinforces the notion that the purpose of reading is to demonstrate comprehension to instructors.

Despite these limited initial expectations, students articulated their discovery that reading encompasses more depth than they previously realized, as reported by Brianna:

Learning that every word has an origin and has many relatives was a surprise to me as well because I did not expect every word to have a background, even the simple words. This has peaked [sic] my interest in reading because it showed me how deep reading can actually be and how it is comprehended in such different ways.

Similar to the depth that Brianna discovered, Anna said, "Now that we are at the end of the semester reading to me is more than just words, to try and explain it it's more so reading is also important for self-exploration."

Enabled through IOI, students' discoveries of greater depth are significant because they expand their concepts of reading to include a focus on comprehension and meaning-making, and they support students' ownership of reading practices, whether for self-exploration or other self-identified goals.

#### ***Etymology as a Source of Motivation for Further Learning***

While all three orthographic dimensions were taught in relation to one another as part of the target instruction, students' reflections reveal that etymological inquiry was an especially prominent aspect of their experience of IOI. Across the many references to etymology, several specific patterns emerged, including students' interest in the subject. Many students directly used the word "interesting" to describe their response to etymological inquiry, while others conveyed a similar essence through phrases like "curiosity." Aaliyah's reflection illustrates this response: "I never paid attention to where

words came from which makes it more interesting to see other words and the roots of them.” Similarly, Malik wrote, “The most interesting ideas and concept I learned from this reading is noticing that in etymonline [sic], morphological relatives could be similar in their meaning and this has made me more curious to learn more.”

Students’ interest and curiosity in response to etymology is a noteworthy finding, especially since it is the most overlooked orthographic dimension and is often reserved for advanced instruction (Adoniou, 2018). Student reactions also identify etymology as a catalyst for continued orthographic investigation and learning, as demonstrated by Aaliyah: “Knowing that I can use etymology makes me want to search every word up to see where it came from and learn the word families.” Similarly, Jenn described the motivation she experienced:

My perspective on words has changed by finding out that every word has a history and what I have learned is that words now are spelled and pronounced differently than they were in the past. Which makes me want to learn more.

Moreover, etymological resources were transformative for Dalton because they provided him with a way to direct his own learning:

So when people say things to me or I read a certain thing I can look up or I will already know the origin behind it and the definition. That is a significant game changer for me in the English language.

These reflections demonstrate the impact that an interest and curiosity towards etymology had on students’ strategic reading practices. Students gained the ability to take ownership of their learning by using etymological resources to locate information on word origins; this information is essential to building deeper word knowledge. Students’ etymological resource use is relevant, as it extends students’ literacy learning beyond the limitations of developmental courses.

### ***Meaning-Based Perspectives towards Words and Language***

As students examined English through IOI, there were noticeable changes in the ways they perceived the language. Many students started the course believing that English was “inconvenient” or “random” and did not “make sense”; however, by the end of semester, students began to see meaning where they had not noticed it before, as Lila’s reflection demonstrates:

By discovering the meanings behind every prefix, suffix and base word, I got a whole new insight into the English language and how other languages contribute to ours. Using Etym.com [sic] was an extremely helpful tool. I discovered the history behind words, their relatives and how they’ve changed to form the words we have today.

Students’ growing awareness about the language was a gradual process, as Morgan details:

In the beginning you introduced Etymology and had us go through the website and look up words. It was very foreign to me and I didn’t really understand. I knew the general theory that there are words and prefixes and suffixes that make different words but the process you had us take, showed, in the end, the larger realm of the connection of words.

Despite Morgan’s initial confusion, IOI ultimately enabled her to understand the orthographic system. As students slowly understood the way meaning is represented in the English orthography, their viewpoints towards the language and their strategies for understanding unfamiliar words changed too, as noted by Nico:

I learned a lot here and I look at words very differently now. And it’s pretty much every time that I try to think of the word sum or what the base of the word is. It’s like a normal thing to do now.

Nico now perceived words through their meaningful units and, more importantly, he explained how morphological analysis has become a normalized practice for him.

Other students noted the complexity of written English but acknowledged that the sophistication of the language did not deter their orthographic learning. In Brianna's reflection, she described the way her expanded orthographic knowledge influenced her literacy capabilities: "The English language is very intricate and meaningful to me, every word has true meaning. I can apply this to my use of words in relation to my writing skills." As Brianna discovered, the orthographic system supports vocabulary knowledge and provides her with a more nuanced way of expressing her ideas in writing. Similarly, Steve described how learning the structure and history of words influenced his comprehension and made reading more accessible to him; moreover, he wondered why he had not learned this information earlier:

The ideas and concepts that were the most interesting and important to me were learning about the structural elements and using strategies to understand words better. It helped me see where many different words come from and their origins. Another thing was how many words have the same base and have almost the same meaning. What I'm more curious about now since I've taken this class is why didn't I learn this in high school? Learning what I learned in this class really makes reading way easier. After taking this class, I have a different perspective on reading.

Overall, students' reflections on their experiences with IOI revealed that it modified their perspective towards words and rendered the underlying rationale for the written language as meaningful, accessible, and practical; more generally, students have identified orthographic knowledge as a support for further literacy learning.

## Discussion

The interpretation of quantitative and qualitative findings of this convergent parallel mixed methods study supports the inclusion of an IOI approach in developmental college reading. Results indicate that IOI can impact literacy skills that developmental college readers have historically struggled with, such as reading comprehension, vocabulary development, and word reading (Elleman & Oslund, 2019; Nippold, 2017). Among these literacy areas, reading comprehension is arguably the most overarching, as the main purpose of reading is to understand and construct meaning. While quantitative results of this study indicate that IOI led to significant gains in students' reading comprehension, as measured by pre- and post Accuplacer scores, qualitative results illuminate possible means through which IOI led to those comprehension gains, particularly by maximizing students' ability to discern meaning on sublexical, lexical, and broader literacy levels. More precisely, on a sublexical level, students reported that their perspectives on words shifted from a random collection of letters to a structure that consists of meaningful parts.

Along with students' sublexical meaning-making, their understanding of morphology, etymology, and phonology supported their comprehension of the orthographic system—a significant development for the way that orthographic knowledge enables reading comprehension and vocabulary acquisition for reading and writing. Because words represent meaning through their structure and spelling and they exist and function within the orthographic system, a literacy approach like IOI can effectively support comprehension on multiple levels. This newfound awareness, though not directly articulated by students as a matter of reading comprehension, is conveyed through students' shift toward meaning-based perspectives towards language and their expanded conceptual understanding of reading.

In addition to reading comprehension, morphological awareness gains, as captured by quantitative measures and students' qualitative accounts of IOI, represent a significant area of growth for students in developmental reading. Given the morphological complexity of academic discourse (Townsend et al., 2016) and the earlier finding that morphological problem-solving differentiates proficient and below-proficient readers at the secondary level (Pacheco & Goodwin, 2015), morphological skills represent a particularly integral component of literacy growth that should be addressed within developmental reading programs. Furthermore, since this study demonstrates that students in developmental reading courses are willing and able to employ morphological strategies within their reading practices, it lends support to the inclusion of instructional approaches like IOI, which can help students develop and refine those skills. Qualitative findings of this study substantiate Trexler's (2021) study, which found that one semester of SWI increased students' use of morphological or etymological reading strategies. Similarly, this study showed that students' independent use of etymology resources enabled them to take ownership of their learning. Furthermore, although motivation was not a specified variable, qualitative results of this study reveal that IOI instruction, especially etymology, captured students' interest, curiosity, and motivation for learning. Increasing motivation for students in developmental reading is significant for the ways motivation can sharpen student focus and persistence when engaging in formidable tasks (Cantrell, 2014). An increase in student motivation also has potential to assuage institutional problems with retention and completion in developmental reading (Center for the Analysis of Postsecondary Readiness, 2021). Thus, future investigations of IOI would do well to measure aspects of motivation and engagement.

## Limitations

Since this study explored the impact of IOI on developmental college readers' morphological awareness and reading comprehension, as well as their experiences of IOI, the participant pool was limited to students that received the target instruction. As no other professors were identified as providing IOI, we had to perform dual roles of both instructors and researchers and study our own classes, resulting in a convenience sample. In addition to these constraints, we also faced limitations within our data sets. More precisely, Accuplacer reading scores were only obtained for 16 of our 38 participants due to Assessment Center availability. Without access to a large sample size or a control group (i.e., this was not a randomized control trial [RCT]), our causal claims on IOI effects are limited. Because of these limitations, we included additional qualitative data to augment our quantitative data and help contextualize the preliminary and exploratory results. The richness of the qualitative data illustrates the effectiveness of IOI and students' engagement as well. Although our qualitative analyses provide more depth from which to interpret quantitative results, even these data sets were bound by some constraints. For example, due to our dual function as instructors and researchers, students might have attempted to provide preferred answers in order to maintain their rapport with us. Also, the self-reported nature of the qualitative data was limited by students' ability to articulate their learning through writing.

## Further Directions

Insights from students' descriptions of their experiences of IOI can be used to inform curricular and instructional revisions to developmental college reading programs. With many recent reform initiatives designed to increase the effectiveness of developmental education (Center for the Analysis of Postsecondary Readiness, 2021; Gokcora &

DePaulo, 2018) reading programs would benefit from an examination of theoretical and pedagogical omissions, including orthographic study.. Omissions have been, at times, the result of prevalent assumptions about developmental students' inability to engage complex material, often resulting in "remedial" or "drill and practice" approaches that isolate subskills (Grubb et al. 2011).

However, this study's results demonstrate that students in developmental reading can engage with the full complexity of the orthography. When students examine orthography through IOI, they recognize the value of a complex but coherent system. In fact, many of the students echoed the sentiments of linguistic scholars (Chomsky, 1970; Chomsky & Halle, 1968) that perceived written English as a near optimal system. The following reflection from Brielle demonstrates her understanding of English orthography:

There are plenty of things that I will take away from this class, starting with Structured Word Inquiry. Things such as: word sums, etymology, morphology, and phonology are prime examples. Word sums are useful because they help us focus on a word's spelling and sound patterns. They also aid in determining the meaning of a word and its function in a sentence. The origin of a word, etymology, is crucial since it informs the true meaning of words. It also provides information on world history and culture. Morphology, or word structure, is significant because it affects spelling, vocabulary, and reading comprehension by allowing us to distinguish between morphemes and their definitions in order to comprehend a word. Phonology, or how a word sounds, is crucial because it allows us to break down new words and grasp their sound or

pronunciation. All of this is what I learned in this class.

As demonstrated, orthographic instruction can simultaneously challenge and motivate students in developmental reading without simplifying or occluding the complexity of the written language. In an educational context where student motivation and morale has historically suffered (Cantrell et al., 2014; Goldwasser et al., 2017), IOI can serve as a catalyst for renewed student motivation and curiosity towards literacy learning. Because these affective dimensions of reading have an impact on reading performance (Cantrell et al., 2014), they are worth examining in future studies of IOI.

By extension, educators must also expand their orthographic knowledge in order to facilitate student learning. Instructors' orthographic expertise is an important area of future focus for its ability to support or detract from student outcomes (Colenbrander et al., 2021; Georgiou et al., 2021). As orthographic study is more prominently included in professional development initiatives and developmental reading curriculum, additional research should be conducted to measure its impact on student literacy.\*

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## Appendix A

There are 5 practices within a critical inquiry (CI) framework: (1) questioning naturalized views, (2) challenging dominant ideology, (3) generating multiplicity, (4) reinscribing power dynamics, and (5) self-reflexive reading. Each of those dimensions is summarized here:

***Questioning naturalized views.*** CI offers students a process to interrogate written English that reveals aspects of the language that are invisible or unquestioned through dominant approaches to literacy. For example, students might encounter words with etymological markers such as the <w> in “two” without ever really noticing them or questioning their purpose. Through a CI framework, these naturalized aspects of language are brought into view so that they become the subject of interrogation.

***Challenging dominant ideology.*** As students investigate the orthography and discover its meaning and logic, they can begin to confront and challenge the ideologies that have been perpetuated through prevalent forms of literacy instruction, especially those that frame the orthography as “irregular” or “illogical.”

***Generating multiplicity.*** In order to facilitate students’ understanding of English orthography, literacy instruction must include multiple dimensions: morphology, etymology, and phonology. Considering only one perspective limits students’ ability to make meaning and understand fully, which is ultimately the purpose of developing literacy.

***Self-Reflexive reading.*** Self-Reflexive reading moves beyond analysis of the written language to prompt students’ consideration of how they participate in shaping the prevalent views and ideology. Within this process, they examine their assumptions about the language and how those assumptions were formed.

***Reinscribing power dynamics.*** As students understand the logic behind the language, they can gain their autonomy within English language learning. Instead of relying on memorization of “irregular” spellings, students can harness more effective approaches to expand their vocabulary.

## Appendix B

The CI instruction used in this study situates literacy practices like reading and responding to texts and engaging in inferential thinking within a critical literacy philosophy. Throughout the CI open access guidebook, students critically read a variety of genres and inquire into the orthographic structure of English with the goal of developing a more holistic view of language.

For example, one section of the guidebook, *Questioning Naturalized Practices*, supports students in exploring both their local environments and the English language for normalized practices that often go unnoticed or unquestioned. In regard to the language, our students articulated what and how they had been taught about English spelling and what those concepts and instructional practices suggest about the language. Many students noted that English spelling is difficult to learn and illogical because numerous words contain “silent letters” and are not spelled the way they sound. These are logical conclusions to draw about the orthography when instruction predominantly focuses on phonology, with a near or total exclusion of morphology and etymology. However, when language instruction includes etymology, the rationale for “silent letters” can be understood and normalized portrayals of the language can be challenged. Moreover, uncovering the etymological roots of words allows for identifying other related words.

Exploring morphological word families enables students to hypothesize morpheme elements such as bases, prefixes, and suffixes and allows them to see the morphophonemic aspect of the language. Within our classroom instruction and throughout the guidebook, students regularly analyzed word relatives derived from the same etymological roots in an effort to learn and understand the meaning, structure, and sounds of words. For instance, as part of our exploration of naturalized practices, students investigated the word *naturalize*. After discussing the meaning, students searched the word on *Etymonline* (Harper, 2022) and discovered that it came from the word “natural,” meaning “one's inborn character; hereditary, innate, by birth” and entered English from Latin through Old French. Within the entry, students were directed to see the word “nature.” Nature derived from the Latin root *natus*, meaning “born,” which derived from the Proto Indo European (PIE) root \*gene-denoting “give birth or beget with derivatives referring to procreation and

familial and tribal groups.” In addition to *nature*, *natural*, and *naturalize*, the PIE root produced a large family of words such as *gene*, *indigenous*, *innate*, *nation*, *national*, *progeny*, and *pregnant*. Students discussed the meanings of these words and how they had a sense of birth, procreation, or familial and tribal groups.

After learning about the history and meaning of this family of words, students analyzed and sorted words to determine which were morphologically related to *naturalize*. Morphological relatives have similar spellings and derive from the Latin *natus*, which produced the English stem <nate> (e.g., *innate*, *nation*, *national*, *nature*, and *natural*). Students analyzed the structure of these words by identifying prefixes and suffixes and constructing morphological word sums, such as in+nate→innate, nate/+ure→nature, and nate/+ion→nation. Moreover, students applied the orthographic convention of replacing a single, final, non-syllabic <e> when vowel suffixes were added to the <nate> stem.

Once students identified the structure, they described how additional morphemes changed the meaning and/or grammar of words. For example, by adding the suffix <-al>, meaning “of, like, related to, or pertaining to,” to the word “nation,” a noun is transformed into an adjective. In this case, the meaning shifts from “a race of people, large group of people with common ancestry and language” to a way of describing something that pertains to a nation (Harper, 2022). Lastly, students examined the phonology within this morphological family. Using the International Phonetic Association’s (IPA) alphabet, the students sorted words based on vowel and consonant alternations. For example, within this word family, the vowel grapheme <a> represents two different phonemes - tense /eɪ/ written in *innate*, *nature*, and *nation*, and lax /æ/ written in *natural*, *naturalize*, and *national*. Students identified three phonemes that the consonant grapheme <t> represents. Within the word *innate*, the <t> represents the phoneme /t/, within *nature*, *natural*, and *naturalize*, the <t> shows the phoneme /tʃ/, and within *nation* and *national*, the <t> represents /ʃ/. The process of sorting and contrasting vowel and consonant alternations and identifying grapheme-phoneme correspondence supports students in learning the morphophonemic nature of written English and the influence of stress on pronunciation (Chomsky, 1970). Moreover, with these exercises, students learn that morphologically related words are spelled consistently even though there may be phonological shifts.

## CALL FOR MANUSCRIPTS

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