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An Examination of Accounting Student Background and Cognitive Ability: Are Students Failing in Critical Thinking?

Matthew J. Sargent*
Bradley G. Winton†

Abstract

The modern workplace demands ever-greater levels of cognitive ability. Corporations need newly hired graduates to enter the workplace with a certain level of critical thinking and reflective judgment skills. Unfortunately, accounting students appear to be falling behind in developing these cognitive skills. This research elaborates on the reflective judgment theory to investigate the backgrounds and cognitive levels of accounting students. The argument is made that certain background factors provide a significant differentiator among students' reflective judgment and that students are below the necessary level of cognitive ability based on existing standards. Data from a study of accounting students in a United States-based university, tested with one-way Anova and dependent t-tests, support the role certain background factors play in student reflective judgment. The results also support the assertions that the cognitive abilities of graduating students do not meet the levels required by today's corporations. These results suggest that accounting schools and accounting educators should employ more effective critical thinking curricula and assignments. This research adds to reflective judgment theory through a better understanding of student cognitive ability that can be translated into application in the classroom. Additionally, this research expands the use of open-ended structures in assessing cognitive abilities.

Keywords: cognitive ability, critical thinking, reflective judgment, accounting education, business education.

I. INTRODUCTION

As a generation ages, that generation sees the next as broken, backward, or behind. A main concern of current business leaders is that younger generations have a lack of critical thinking skills caused by their dependence on modern electronic devices and search engines to think for them, versus accessing information and leveraging their critical thinking skills for problem-solving (Tulgan, 2018). Accounting students today fall prey to this same line of thinking, especially within many of today's accounting schools, and corporations see a skills gap that will negatively impact the economy and innovation (SHRM, 2019). Even those accounting graduates who may not be seen as having fallen behind may still be seen as lacking the critical thinking skills necessary with the onset of technologies such as robots, automation, and artificial intelligence (Pew Research Center, 2017).

A report by the society of human resource management/SHRM (2019) highlights that 51 percent of corporate respondents view educators as doing little or nothing to help

* School of Accountancy, College of Business and Economic Development, The University of Southern Mississippi, 118 College Drive #5178, Hattiesburg, Mississippi 39406, USA, E-mail: matthew.sargent@usm.edu.

† School of Leadership, College of Business and Economic Development, The University of Southern Mississippi, 730 E. Beach Blvd., Long Beach, MS 39560, USA, E-mail: bradley.winton@usm.edu.

students garner the skills they need to compete in this new workforce environment. These skills include problem-solving, innovation and creativity, dealing with complexity, critical thinking, and reflective judgment. This problem may be accelerating, and the Pew Research Center (2017) straightforwardly states this assertion when it says that students must "learn how to learn" to keep up with the pace of change in the workplace (p. 20).

Stakeholders across higher education, especially accounting students and their schools, appear to bear an especially heavy burden when dealing with this rapidly changing accounting environment (Brammer & Clark, 2020). This has ultimately led to a skills gap where corporations find it very difficult to hire individuals with the new skills they need (SHRM, 2024). Critical thinking and problem-solving are the top skills candidates are missing, as most organizations report a lack of sufficient critical thinking and problem-solving skills (Ho, 2022). In addition, studies have shown that only 5% of accounting students demonstrate the critical thinking ability expected of entry-level accountants (Wolcott & Sargent, 2021). This is despite repeated calls for progress within accounting programs to address the need for stronger critical thinking skills in accounting students (Pincus et al., 2017; Wolcott & Sargent, 2021; and Sargent & Winton, 2023).

Throughout their educational journey, students struggle with the new normal of internal and external engagement, limited institutional relationships, changes to international study programs, and social factors amongst themselves, faculty, and staff. Each student has been impacted differently, and these students' demographic and educational backgrounds matter as accounting schools develop new learning techniques to react to changing workforce demands (Brammer & Clark, 2020). Several questions result from this discussion of the impacts of a changing work environment and today's skills gap. Can accounting educators better understand the backgrounds of their students to enhance skills such as cognitive ability? Furthermore, are accounting students as far behind in their critical thinking skills as perceived by today's corporations?

Critical thinking and reflective judgment are essential to a person's overall cognitive ability. Critical thinking skills assist individuals in assessing complex situations through interpreting facts, generalizing concepts, and recognizing fallacies within logic (Sargent & Winton, 2023). Strengthening students' critical thinking skills is a primary goal of higher education because it improves students' problem-solving abilities and is a significant part of the learning process (Abrami et al., 2008; Stupple et al., 2017; and Soufi & See, 2019). Educators must focus on building these cognitive abilities, and students who have attended universities are more likely to develop stronger cognitive abilities than peers who have not (Wolcott & Sargent, 2021; Meyer et al., 2024).

From a practical perspective, this focus on cognitive ability allows students to find themselves ready for today's workplace. For example, using big data drives more creative and innovative thinking. In the accounting world, the use of big data can significantly improve audit quality and the use of professional judgment during the audit (Brown-Liburd et al., 2015). When accountants possess stronger cognitive ability, they can better evaluate the complexity of a situation and more effectively use their professional judgment (Bucaro, 2019). Understanding the student factors that need extra focus may allow educators to achieve higher levels of reflective judgment in their students. Further, assessing students' cognitive ability via the reflective judgment model standard allows for assessing where and how much change to today's business curriculum is necessary. This insight shows that an accounting student is better prepared to enter the workforce successfully. This is critical to students' success as cognitive ability is the best predictor of job performance (Sackett et al., 2024).

Critical thinking skill levels can be best assessed using a cognitive development model, and the reflective judgment model is the most extensively studied and best known (Mayhew et al., 2016). Reflective judgment and critical thinking are significant parts of a person's cognitive ability, and the reflective judgment model focuses on how a student's fundamental assumptions about knowledge can impede their critical thinking development (King & Kitchener, 1994). Individuals use reflective thinking when they recognize the existence of a problem that cannot be solved with absolute certainty. King and Kitchener (1994) expanded the concept of reflective thinking with the term "reflective judgment," which describes an epistemic cognition that includes the recognition that an issue contains real uncertainty. King and Kitchener created the reflective judgment model to explain how a person's epistemic assumptions develop over time and how that development can impact their reflective thinking skills (King & Kitchener, 1994). Reflective judgment develops through active engagement with topics that require critical thinking (Dwyer et al., 2014). Through this engagement, more robust development of reasoning and reflective judgment abilities can be allowed to form (Dawson, 2008). This is the process by which growth and experiences affect a student's thoughts.

The use of the reflective judgment model provides two important theoretical implications. Reflective judgment provides a model of cognitive and intellectual development that is best in line with higher education research on the teaching of critical thinking skills (Mayhew et al., 2016; Wolcott & Sargent, 2021). Through its use, educators in accounting schools can move beyond learning models focused on structure, conception, approach, and motivation (Turner & Baskerville, 2013) to focus instead on students' epistemological beliefs. In addition to proliferating a model that understands the importance of critical thinking, this research hopes to highlight the need for cognitive ability measurement beyond traditional critical thinking measures based on student perceptions. This research utilizes the lectical assessment system (LAS) to separate the structure of performance, which is the cognitive developmental level, from the base content of a performance. Evaluating the performance structure of the assessment versus just the content provides the LAS an advantage over base content scoring systems (Dawson-Tunik, 2004). These advantages allow for an examination of students in a "real-world" scenario to see where students are and what may be driving their cognitive abilities.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Cognitive ability is not about the knowledge learned by an individual throughout their academic and business careers, or just the memorization of facts. With that in mind, one of the purposes of the educational environment should be to help individuals learn to think for themselves because their cognitive ability allows them to comprehend various situations better, gather the data, create the needed information, and make the appropriate decisions. In turn, those decisions are used to drive achievement and future potential. Thus, cognitive ability must be continually developed throughout their lives.

Cognitive ability is thought to be our general level of intellect (Hunter, 1986). It is used when an individual engages in reasoning, problem-solving, planning, engages in critical thinking (abstract thinking), or comprehends complex ideas (i.e., reflective judgment) and, as a result, learns from the experience (Gottfredson, 1997). Cognitive ability includes numerical ability, mechanical-spatial awareness, critical thinking, and reflective judgment (Fradera, 2017; Otero et al., 2022). Cognitive ability drives how we choose to engage in learning and solve problems of various levels of complexity, and the

best students go beyond the practice of memorizing random pieces of information (Shah, 2015). Developing our cognitive abilities to an advanced level is important because it makes learning more straightforward and more challenging when our cognitive abilities are not as advanced (Bhat, 2016).

2.1. Cognitive Development

The development of cognitive abilities is a critical product of higher education, and those outcomes should align into two categories: knowledge application and the use of reflective judgment (Carini et al., 2006; Kuh et al., 2006). Students should understand how to apply knowledge, become better critical thinkers, develop reflective judgment, and learn how to make better decisions during their years in higher education. The higher education environment should significantly increase their analytical, intellectual, and critical thinking skills while also increasing their ability to be more flexible from an intellectual perspective (Pascarella & Terenzini, 2005). Research has shown that critical thinking is significantly correlated with reflective judgment, and students who score high on dispositions to critical thinking can significantly increase their reflective judgment abilities over time (Dwyer et al., 2015).

There are multiple models of cognitive development, and common themes exist across these models, which have been continually introduced within higher education. The first is that cognitive ability will range from less to more complex. Second, an individual has to solidify those less complex cognitive skills, and then they will be able to develop more complex cognitive skills. Third, many individuals within the higher education environment will operate at a cognitive level that does not allow for them to achieve the ability to think critically at an adequate level. Lastly, any educational efforts should be cross-curricular; this development does not progress quickly. Hence, students need adequate time for their skills to develop appropriately (Wolcott et al., 2002). What is less known is whether the individual variables of an individual's motivation, experiences gained via life experiences, or the formal classroom seem to be the most relevant in developing cognitive abilities in the educational environment.

As previously noted, critical thinking skills tend to develop in a series of fluctuations, and those skills need different experiences to develop effectively. To assist with this, individuals should engage in learning experiences that will help expand their previously learned experiences. This process will provide opportunities to practice new skills that align with their current level of development and use these experiences and opportunities to lay the foundation for continued development. Particularly, the ability to think critically at a high level is an essential skill set for any student. As part of their education, students should learn to apply critical thinking skills (Kealey et al., 2005). However, the process of critical thinking is more than just the use of a skillset. The process of critical thinking requires the individual to think about thinking (i.e., metacognition) in addition to using their prior knowledge and learned experiences. Critical thinking requires individuals to use any knowledge gained from their experiences to help achieve a better understanding of something new to them. Students possess different critical thinking levels because their life experiences will vary. As such, students in business courses will be at varying levels of cognitive development because of their unique experiences (Wolcott & Sargent, 2021).

Although an individual develops stronger cognitive ability through the processes and operations of critical thinking, the ability to engage in reflective judgment shows a higher level of cognitive ability, as it helps an individual have a deeper understanding of problems and how to justify their level of knowledge (King & Kitchener, 1994).

Accounting students must be able to engage in reflective judgment to help them work through complex situations. Through this lens, reflective judgment enhances an individual's critical thinking and cognitive abilities.

2.2. Reflective Judgment

Reflective judgment is when individuals can use their knowledge and experiences to review and explore situations and better clarify potential outcomes (Bourner, 2003). Reflective judgment is a higher order of reasoning that occurs when an individual understands that there is not only one solution but that problems have multiple possible solutions. Instead, to understand the problem, an individual needs to assess sufficient evidence to work through many possible solutions.

The term "reflective judgment" responds to numerous theories on cognitive development and focuses on using epistemic cognition (King & Kitchener, 2004). The original basis for reflective judgment outlined three levels of cognition. These levels are thoughts, metacognition, and epistemic cognition. Epistemic cognition is when an individual monitors the epistemic nature of a problem (i.e., underlying assumptions about knowledge) and how various solutions are assigned a truth value based on whether an individual believes the solutions are true or false (King & Kitchener, 1994).

The reflective judgment model describes how individuals develop the ability to reason starting in their youth and continue their development as they become adults. Although the early stages of epistemological development occur in children, it is not until adulthood that individuals can understand the epistemic nature of a problem and use reflective judgment to help solve dilemmas. The model of reflective judgment helps to describe the changes in those epistemic assumptions and how those assumptions will impact the development of cognitive abilities in young adults, especially college students. Multiple research studies have been conducted on the reflective judgment model, and it has been used by psychologists, college faculty, and those concerned with college outcomes assessments (Fischer & Pruyne, 2003). In addition, multiple studies support the validity of the reflective judgment model and use it within the cognitive development process in various settings, including higher education (Wlodarsky & Walters, 2010; Zhou & Tan, 2020).

The main advantage of using the reflective judgment model is that it can be combined with any description of critical thinking, including Bloom's taxonomy, and be used to help increase students' cognitive ability. Students can progress through stages of reflective judgment during their journey through the higher education environment (Kitchener & King, 1981). However, a student may show the ability to use reflective judgment in one course and not in another (Wolcott & Sargent, 2021). As such, students will not advance from one stage of reflective judgment to the next just from being exposed to one course (Pascarella, 1989). Thus, this ability appears and disappears based on the needs of the course, and it can be challenging to have the skills consistently visible across multiple areas of their overall coursework (Mason et al., 2006). That said, there is a need to better understand the backgrounds of students and where they may be in relation to their theoretical level of reflective judgment.

2.3. Hypotheses Development

The limited findings related to the impact student backgrounds have on cognitive abilities are mixed depending on the construct utilized and the type of measures. However, researchers find consensus on the idea that college attendance generally facilitates the development of students' cognitive skills, including critical thinking and reflective judgment, where students more skillfully pursue answers to critical questions

and do so with flexibility of thought (Pascarella & Terenzini, 2005; Wolcott & Sargent, 2021). With this idea in place, a more complete examination of reflective judgment and its role in college education is possible through an understanding of the differences between students.

Researchers have noted that understanding potential biases and variations in a model based on factors seen as static (e.g., gender, age) bolsters external validity. To that end, the first hypothesis centers on variation based on gender. Gender is a demographic variable and control mentioned throughout the cognitive ability literature. Generally, research studies do not find significant differences between males and females when examining overarching cognitive ability and outcomes such as academic achievement (Roth et al., 2015; Ruffing et al., 2015). Certain studies have become more granular by examining critical thinking and found that critical thinking abilities are also relatively independent of gender differences (Buehl et al., 2002; Preiss et al., 2013). Yet, other studies find that gender differences on cognitive tests turn up consistently, with males outperforming on quantitative, visual/spatial, and epistemological thinking and females outperforming in relation to verbal skills, advanced beliefs, and judgment (Schommer, 1993; Schommer & Dunnell, 1994). A longitudinal study specifically on reflective judgment by King and Kitchener (1994) found no gender differences in three of the four analysis periods, but did find males scoring significantly higher in the fourth period. These results align with the notion that women's reflective judgment growth curves steepened during their late teens, while men saw an acceleration of reflective judgment growth as they completed their college education (Kitchener et al., 1993). Taking these insights into consideration, and in concert with the focus of this study on students in the process of completing their business major courses, this research hypothesizes that there will be significant differences between the levels of reflective judgment between males and females.

H_1: there is a significant difference between students' levels of reflective judgment based on gender.

There have been calls to investigate other educational-focused variables. One of these variables is the class status (i.e., freshman, sophomore, junior, senior, etc.) or the educational level of students as it relates to cognitive abilities (Whitten & Brahmasrene, 2011). Researchers have found that grade level plays an important role in the development of cognitive abilities and the transformation of these abilities into academic performance (Tikhomirova et al., 2020). Based on meta-analysis, Roth et al. (2015) note that the relationship between cognitive ability and academic achievement becomes stronger as a student moves higher in their academic level. King and Kitchener (1994) find that educational level is more significant and consistent depending on reflective judgment scores of cognitive abilities. A trend of increased critical thinking skills with progression through schooling is found across grades in both middle school (Schommer, 1993), undergraduate (King & Kitchener, 1994), and graduate studies (Jehng et al., 1993). With greater and greater exposure to advanced thoughts and education, students acquire greater knowledge and cultivate more sophisticated thinking skills (Mason et al., 2006). Higher education aims to enhance students' epistemological thinking, push them to think critically, and help them reach greater cognitive abilities. Theory and research combine to predict that this goal can be met by finding differences between the cognitive abilities of students at distinct class levels.

H_2: there is a significant difference between students' levels of reflective judgment based on class status.

As seen above, there is a potential for student's reflective judgment to vary based on background variables. Further, academic performance varies on a variety of factors, including individual skills, social or economic backgrounds, past educational experiences, and mental or emotional state (Farooq et al., 2011). Based on the developmental levels of Skill theory, the brain reorganizes the factors and the behaviors they create (Fischer, 1980). This reorganization of behavior facilitates the use of new higher-order cognitive ability levels built upon combinations of previously constructed lower-order cognitive abilities. Skill Theory outlines the professional maturation of individuals and how an individual's environment contributes to the development of said skills. As individuals develop complex reasoning, their developmental range will fluctuate between functional and optimal skill levels based on their environment.

The demographic and educational backgrounds of accounting students create variability in the amount and rigor of critical thinking training experienced. Looking solely at the variability of curriculums from accounting school to accounting school highlights the range of experiences students will have with cognitive ability training. Variability such as this represents a strong environmental factor in the development of reflective judgment. This is especially true considering that reflective judgment requires an individual to coordinate multiple views, so the skill cannot develop until adults can engage in abstract thought (Fischer & Pruyne, 2003). Students must move through periods when their skills grow at a faster pace because they are in an environment that supports optimal performance, while also moving through times of slower growth or no progress at all (Fischer, 2008). Reflective judgment will be unstable as a student learns. In turn, a student's cognitive development will flow in a disjointed manner through stages, and any new cognitive skill is fleeting unless a student continually performs the skill (Fischer & Bidell, 2006). Unfortunately, despite the development of critical thinking skills being an important requirement for accounting students, the current state of cognitive training in accounting schools is limited (Wolcott & Sargent, 2021; Terblanche et al., 2023).

Based on this line of thinking, this research asserts that there will be a significant difference between the reflective judgment level of students and the standard they should reach based on their educational level. Table 1 provides a breakdown of the lectical score range utilized within this study and its equivalent skill level, reflective judgment level, and educational level. For example, an undergraduate student on level would perform within the lectical range of 1100 to 1199. Previous research amongst a set of students not specific to business studies shows that undergraduate students of both traditional and non-traditional age exhibit reflective judgment performance patterns below educational level (King & Kitchener, 1994). Further, the standard deviation of these performance patterns highlights that students could be an entire order of magnitude lower in reflective judgment skills than prescribed.

H$_3$: there is a significant difference in students' reflective judgment level versus the reflective judgment standard based on educational level.

Insert Table 1 here.

III. RESEARCH METHODOLOGY

3.1. Sample and Data Collection

The population for this research included students enrolled at least part-time in accounting courses at a major university. For this study, the sample frame resulted in 120 students that enrolled at least part-time in undergraduate accounting courses at a major university in the southwest United States. Although differences exist between the core subject matter within the different courses, there are similarities. For example, implicit

critical thinking instruction occurs in both courses through data analysis assignments and various concepts within the subject matter. In addition, students investigate professional judgment through various assignments. Data analysis is a critical ability for accounting students. With the students in this sample focused on a range of accounting topics, these assignments promote critical thinking and encourage specific understanding of foundational knowledge simultaneously (Wilkin, 2017).

The sampling of accounting students from the courses resulted in 86 valid responses. Students were recruited by class announcements and an initial class meeting through a non-probability convenience sample method, a standard practice in business and developmental sciences (Jager et al., 2017). All students in the classes were given an opportunity to join the study. If they volunteered, they were given 25 extra credit points at the end of the semester if they appropriately completed all the necessary components of the study. If a student did not wish to volunteer for the study, they could request an alternative extra credit assignment that took approximately the same amount of time to complete as all the necessary components of the study. The student could also volunteer and subsequently ask to be removed from the study or request an alternative extra credit assignment.

A series of tools and assessments worked in concert to obtain data for this research. QuestionPro was employed as the vehicle for online surveys to collect demographic data. The lectical reflective judgment assessment (LRJA) followed and assessed 106 respondents. LRJA completions totaled 91. However, lectica administrators identified five responses, reviewed them, classified them as counterfeit, and deleted them from the data sample. Grades from each course were compiled to represent all academic performance measures.

The final sample of 86 had the following characteristics. Gender was evenly distributed (51.2% male). Traditional college-age students made up the sample (64.0% under the age of 25). The majority of the sample was enrolled full-time at the university (67.4%) and was a U.S. citizen (89.5%). The majority of the sample (86%) were students with accounting as their primary major or combined as a double major. The distribution of student majors was accounting (33.7%), accounting/finance double majors (43.0%), accounting/information systems double majors (9.3%), finance (8.1%), marketing (3.5%), and other business (2.3%). All students were designated as upperclassmen, and 67.4% transferred from another institution. Finally, most students were working at least part-time (67.5%).

3.2. Measure and Analysis

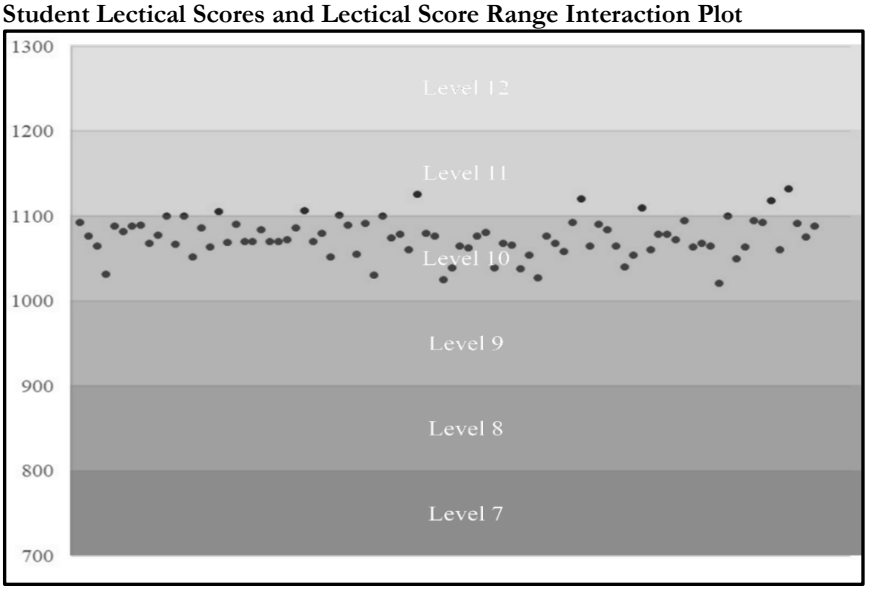
The LRJA was utilized to measure students' levels of reflective judgment. The LRJA utilizes an online writing assessment to place individuals on a scale of cognitive ability based on hierarchical complexity and concepts of cognitive development established by piagetian and skill theory (Fischer, 1980). The LRJA can be taken as a written or electronic assessment with no time limit. For this study, the LRJA was used as a summative assessment. Summative assessments help determine an individual's level of competence as part of a program evaluation or research project (Lectica, 2022).

The lectical assessment system scores respondents' answers via continuously updated artificial intelligence, with each new assessment becoming ever more accurate (Lectica, 2022). The output of this assessment is an overall score that places students on the lectica development scale. These overall scores of reflective judgment map onto this scale and provide both a theoretical and practical point of reference for each student. Table 1 shows the alignment between the raw lectical scores, lectical levels, onset and

educational timing, the Fischer (1980) skill levels, reflective judgment theory levels (King & Kitchener, 1994), and equivalent workplace roles. This is also visually represented in Figure 1.

Figure 1

Student Lectical Scores and Lectical Score Range Interaction Plot



A series of studies have reported on the internal consistency and reliability of the LRJA, with scores ranging from .95 to .98 (Dawson et al., 2003; Dawson-Tunik., 2004; and Dawson-Tunik et al., 2005). Inter-rater agreement has been shown at a minimum of 85%, and within 1/5 of a lectical level in the LRJA assessment (Dawson-Tunik et al., 2005), which means the LRJA can detect 4 to 7 distinct phases of performance within the classroom (Lectica, 2022). Other studies have reported on the convergent validity of the lectical assessment system (LAS) and found that the LAS and other clinically validated cognitive developmental assessment systems all assess the same dimensions of performance (Dawson, 2003; Dawson et al., 2003).

The hypotheses surrounding demographic and educational variables were tested with one-way Anova in the SPSS Statistics software. The hypothesis related to the student reflective judgment level versus the standard is tested with a dependent t-test. Before Anova testing was carried out, the common tests to address the assumptions for Anova testing (e.g., independence of observations, no significant outliers, normal distribution of the dependent variable, and homogeneity) were completed, and no issues with the data were noted.

IV. RESULTS AND DISCUSSION

The analysis found results highlighting the significant difference in student reflective judgment scores (i.e., LRJA lectical scores) between the sample means based on demographic and educational variables. Gender represents the first demographic variable analyzed. Lectical scores were significantly different for males and females, $F(1,84)= 14.039$, $p<.001$, thereby supporting hypothesis 1 (Figure 2). The analysis also supported hypothesis 2 by exhibiting a statistically significant difference in reflective judgment based on class status (i.e., juniors, seniors, and 5th-year seniors), $F(2,83)= 3.322$, $p<.05$ (Figure 3).

Figure 2
Gender and Mean Lectical Scoring

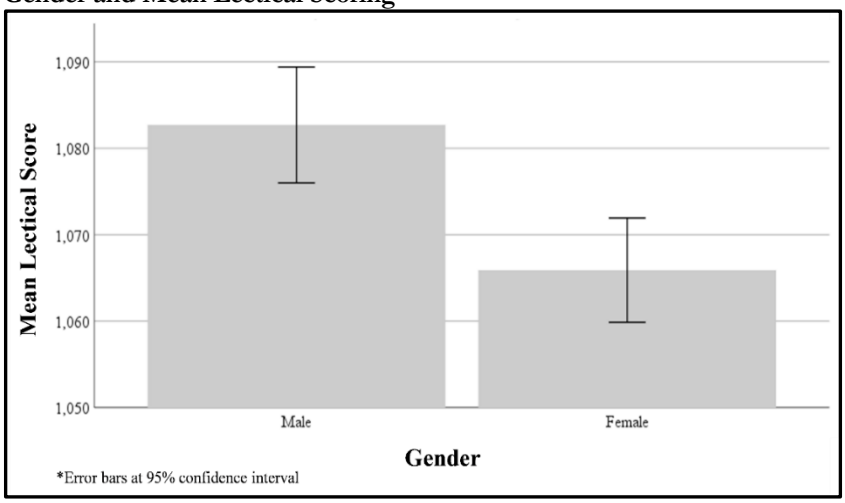
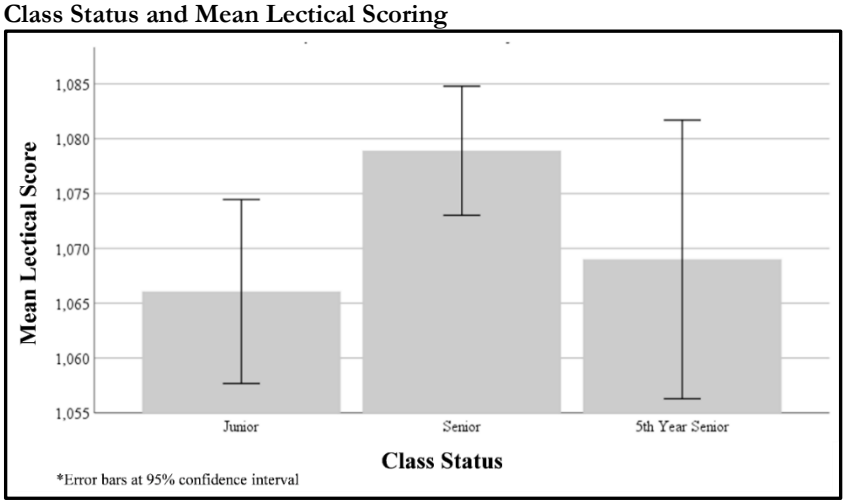


Figure 3
Class Status and Mean Lectical Scoring



Paired-sample t-testing provides support for hypothesis 3. Students exhibited lower reflective judgment scores (M= 1074.5, SD= 22.3) as opposed to the standard at which students of their level should achieve (M= 1100.0). Students' mean lectica scores exhibited a statistically significant difference to the lectical standard and were 25.5 points lower than the standard, 95% CI [-30.3,-20.7], t(85)= -10.594, p<.001.

4.1. Discussion

The results of this study provide a better understanding of accounting student backgrounds in relation to their levels of cognitive ability. In contrast to other studies, the results found significant differences in reflective judgment between men and women. Further, the results bolster the assertion that males see an acceleration in their reflective judgment growth at the end of their higher education journeys (King & Kitchener, 1994). This acceleration appears to not only close the gap but also take male respondents beyond their female counterparts. This understanding allows accounting educators to pay special attention to gender differences in the classroom. A critical thinking curriculum can be refined by understanding differential cognitive growth rates.

This insight into student backgrounds related to gender also goes into educational aspects. Reason follows that as students experience more of this advanced cognitive training, they will acquire more sophisticated thinking skills (Mason et al., 2006). While the results showed significant differences between each of the three classes of students, the general upward trajectory from junior to senior status was broken by 5th-year seniors. These findings highlight the potential need to keep accounting students progressing on their degree plans and in their critical thinking growth without the slowdowns, starts and stops, and breaks inherent with a five-year undergraduate timeframe. Bivariate correlations on background variables suggest that this progression does not relate to general indications of academic performance in GPA. With a diverse range of variables affecting GPA, this generic student qualifier does not provide the usefulness to accounting educators that specific grades related to critical thinking assignments (e.g., data analytics, case study) would. Simply put, subject matter expertise matters less than effective critical thinking instruction with respect to student performance (Tiruneh et al., 2014) and workforce readiness.

As a general implication of accounting education practice, applying cognitive skills across the accounting school curriculum and specifically within each accounting discipline provides students with more than subject matter expertise. Students can find the most effective means for expanding their cognitive ability through a combination of core professional accounting skills and experiences directed specifically at cognitive ability (Abrami et al., 2015; Wolcott & Sargent, 2021). By employing these practices, accounting schools and their faculty may be able to change the existing state of reflective judgment levels. The findings herein show that these levels are below what can be expected. Corporations appear to have reasonably assessed that accounting student graduates are behind in critical thinking skills. All is not lost if faculty can go beyond guessing what students may need beyond core accounting knowledge by employing ongoing activities throughout a course that force students to both acquire and utilize new knowledge (Kim, 2009). Students need to actively participate in joint decision-making, problem-solving, and data manipulation by breaking down their experiences, making assumptions about decisions, creating solutions, and understanding the instability of contemporary business conditions.

V. CONCLUSION

5.1. Research Implications

If the goal of accounting educators is to promote the thinking skills of students (Hashemi, 2011), the curriculum needs to utilize a pointed model of cognitive development. The use of the reflective judgment model in this research provides a starting point for more in-depth analysis based on common levels of complexity that accounting students are likely to encounter in the workplace. Students' epistemological beliefs affect how they approach complex problems (Wolcott & Sargent, 2021). Therefore, it is necessary to factor in these beliefs as educators continue to explore the reasoning and most effective methods to develop cognitive abilities.

Further, the use of the reflective judgment model allows researchers to move beyond commonly used tests for the measurement of cognitive ability. These standardized tests (e.g., IQ tests, California Critical Thinking Skills Test) rely on multiple-choice questions to measure intelligence and cognitive skills. These tests are quick and efficient but lack the depth that open-ended questions afford. The LRJA utilizes a writing assessment that provides a measure of the hierarchical complexity of students' critical thinking and reflective judgment. Ultimately, this assessment allows researchers to gather

a more nuanced understanding of student cognitive ability that can be translated into application in the classroom.

5.2. Limitations and Future Research

The primary limitation of this research relates to the complex nature of the higher education environment. Numerous variables within the educational context play a role in the development of students' cognitive ability. This research attempts to examine a portion of these variables and clarify their impact but does not attempt to go beyond certain demographic and educational background variables. Future research would do well to continue to explore the complex subject of critical thinking and reflective judgment by examining the effects and interactions amongst variables related to students' experiences, learning modality, financial circumstance, cultural affiliation, and more.

Additionally, despite the positive attributes of the LRJA, there are risks to internal validity, primarily through confounding. In this case, confounding factors may mask a difference or show an apparent difference when no association exists. Numerous financial, political, and technological factors could impact how the participants view and respond to the dilemmas presented in the LRJA. Those factors could impact the results of the LRJA, which is used as the measure of a respondent's cognitive ability, and this study will not be able to capture the impact of those forces on the environment. Researchers would do well to focus on controlling for known confounding variables as they examine cognitive ability.

Finally, the generalizability of these findings is limited by the single university nature of the dataset. Attempts were made to assess the findings' generalizability by comparing the study sample's demographic information to that of post-secondary students in the United States. This assessment shows that some characteristics of the sample do not align with this broader population. Therefore, generalizing the results of this study should be done with caution. Future studies could enhance the generalizability of their cognitive ability studies by employing a multi-university study that includes a varied group of institutions based on enrollment, geography, mission, and diversity.

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Table 1
Lectica Score Alignment with Theoretical and Practical References

				Theoretical Reference		Practical Reference		
Lectical Score Range	**Lectical Levels**	**Age of Onset**	**Skill Levels (Fisher, 1980)**	**Concepts**	**Reflective Judgment (Kitchener & King, 1994)**	**Education Level (Grade)**	**Role Types**	**Management Focus**
700 – 799	7	4-5 yrs	Representational Mappings	Coordination or modification of like concepts, such as ranking (i.e., camping>fishing) or linear logic (i.e., he takes money away, he is mean).	Stage 2	O – K		
800 – 899	8	7-8 yrs	Representational Systems	Coordination of systems such as the concept of trust and its interaction with relationship modification.		1 – 2		
900 – 999	9	10-11 yrs	Single Abstractions	Coordination of abstract concepts such as trust beyond particular situations and to qualities that produce trust.	Stage 3	4 – 5	Unskilled Labor	
1000 – 1099	10	14-15 yrs	Abstract Mappings	Coordination or modification of abstractions such as the elements essential to a good relationship.		8 - 9	Semi-Skilled & Skilled Labor; Pre-Management	Individual (Personality, Skills, Attitudes)
1100 - 1199	11	22+ yrs	Abstract Systems	Coordination of a systems of a abstractions such as personal integrity which coordinates concepts of fairness, trustworthiness, hinesty, etc.	Stage 4 & 5	15 – 16 (Undergrad/ Grad)	Executive/Senior Leader; Highly-Skilled Profesional	Group Integration (Roles, Relationships, Org. Systems)
1200 - 1299	12	26+ yrs	Single Principles	Coordination of abstract systems such as the idea of the social contract which considers the interaction of individuals and their interaction with collective systems.	Stage 6	Ph.D.+	CEO; Executive Leader, Large Org.	Dynamic Organizational Systems (Marketplaces, Economies, Society)