

# The role of dyscalculia and dyslexia in accounting learning: A study on Muğla Sıtkı Koçman University students

(Muhasebe öğreniminde diskalkuli ve disleksinin rolü: Muğla Sıtkı Koçman Üniversitesi öğrencileri üzerine bir araştırma)

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## Abstract

The effects of dyslexia, a verbal learning disability, and dyscalculia, a mathematics learning disability, on accounting learning were examined in this study among university students enrolled in accounting courses. In previous studies on this subject, the aforementioned effect has been examined by comparing students' performance in accounting courses with their performance in mathematics courses in terms of dyscalculia. Given that the accounting course includes both verbal and numerical components, the impact of dyscalculia and dyslexia on students' accounting learning makes up the study's unique topic. This study utilized survey technique conducted both online and face to face. The main population of the study consists of students enrolled in accounting courses, which are named differently according to their departments, at the Faculty of Economics and Administrative Sciences of Muğla Sıtkı Koçman University. The accounting achievement score is the dependent variable representing accounting education, while the self-reported dyscalculia and dyslexia symptom level are the independent variables. According to the analyses, it was determined that there is no significant relationship between self-reported dyscalculia and dyslexia symptom levels and accounting learning. The findings indicate that the effects of dyslexia and dyscalculia learning difficulties may extend beyond academic situations such as accounting learning.

## Keywords:

Accounting Learning, Dyscalculia, Dyslexia

## Paper type:

Research

## Öz

Çalışmada matematik öğrenme güçlüğü olan diskalkuli ile sözel bir öğrenme güçlüğü sayılabilecek olan disleksinin muhasebe öğrenimine olan etkisi muhasebe dersini alan üniversite öğrencileri kapsamında araştırılmıştır. Konuya ilişkin önceki çalışmalarda söz konusu etki, diskalkuli boyutunda öğrencilerin muhasebe dersindeki başarı durumları ile matematik dersindeki başarı durumları kıyaslanarak incelenmiştir. Muhasebe dersinin hem sözel hem de sayısal bileşenler içerdiği göz önüne alındığında, disleksi ve diskalkulinin öğrencilerin muhasebe öğrenimi üzerindeki etkisi, bu çalışmanın özgünlüğünü oluşturmaktadır. Bu çalışmada çevrimiçi ve yüz yüze şekilde yapılan anket tekniğinden yararlanılmıştır. Muğla Sıtkı Koçman Üniversitesi İktisadi ve İdari Bilimler Fakültesi'ndeki bölümlere göre ismi değişen muhasebe dersini alan öğrenciler çalışmanın ana kütlesidir. Muhasebe öğrenimini temsilen muhasebe başarı puanı bağımlı değişken, öz bildirim dayalı diskalkuli ve disleksi belirti düzeyi ise bağımsız değişkenlerdir. Analizlere göre öz bildirim dayalı diskalkuli ve disleksi belirti düzeyinin muhasebe öğrenimi üzerinde anlamlı bir ilişkisinin olmadığını saptanmıştır. Bulgular, disleksi ve diskalkuli öğrenme güçlüklerinin etkilerinin muhasebe öğrenimi gibi akademik durumların ötesinde olabileceğini göstermektedir.

## Anahtar Kelimeler:

Muhasebe Öğrenimi, Diskalkuli, Disleksi

## Makale türü:

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## **Introduction**

Accounting courses taught at universities are generally perceived by students as purely numerical subjects, often associated with a high level of difficulty. However, upon examining the content of accounting courses, it becomes evident that although mathematics plays a role, it is inaccurate to consider the course as entirely dominated by mathematical principles. Accounting encompasses legal regulations such as laws, statutes, and directives, and also involves a verbal structure through accounting-specific principles and standards. In this context, it can be asserted that accounting courses represent a combination of numerical and verbal content. Individual differences and learning difficulties are among the primary factors influencing success in accounting education. Dyscalculia is identified in the literature as a specific learning difficulty related to the challenges individuals face in learning, understanding, and comprehending numerical concepts. Also referred to as mathematics learning disability, dyscalculia is characterized by deficiencies in perceiving and applying numerical operations. Given that numerical processes constitute a significant component of accounting courses, this condition may pose additional challenges for students with dyscalculia. Consequently, students may form prejudgments labeling accounting as a "difficult" subject, which can negatively affect their academic performance. On the other hand, dyslexia, similar to dyscalculia, is a specific learning difficulty characterized by challenges in reading, decoding, spelling, and comprehending written texts accurately and fluently. The field of accounting, beyond its numerical content, heavily relies on legal frameworks, accounting standards, and professional terminology, all of which contribute to its verbal dimension. These elements, which reflect the verbal dimension of accounting, highlight the importance of verbal expressions as well as numerical data in accounting education. In order to be able to perform the numerical solution of financial events examined in accounting, it is also important to correctly understand and interpret the rules in these verbal expressions. Therefore, students with dyslexia may also encounter various difficulties in achieving success in accounting courses.

This study examines the relationship between university students' performance in accounting courses and the presence of dyscalculia and dyslexia. The primary objective is to demonstrate that factors influencing success in accounting are not limited to numerical learning difficulties but also encompass verbal learning difficulties. Accordingly, the academic performance of students in accounting courses will be evaluated in the context of both dyscalculia and dyslexia, analyzing the impact of these two learning difficulties on academic achievement. The findings of this research are expected to contribute to the development of a more inclusive approach in accounting education, considering individual differences. Thus, the originality and academic value of this study will be distinctly highlighted.

## 1. Accounting Education

Accounting education is to inform students about the determination of financial information that can benefit the decisions to be taken in the enterprise, to classify it under records, to report it by checking its accuracy. Accordingly, it is aimed to develop students' ability on how to use the reported information in the decision-making process. Enhancing accounting students' professional knowledge and abilities is considered crucial in an era where there is a growing demand for accounting personnel capable of presenting firm financial data in a comprehensive, accurate, impartial, and high-quality manner. The primary influence in this approach is the accounting education that students receive. It can be said that effective business decisions, high-quality accounting information, high-quality accountants, and high-quality education all contribute to the significance of accounting education (Daştan, 2009: 144).

In Turkey, accounting education is taught at the undergraduate level in faculties like the Business Administration, Economics and Commercial Sciences, and Economics and Administrative Sciences faculties, as well as at the associate degree level in vocational institutions. Accounting education at the undergraduate level is mostly included in the curriculum of Business Administration, Economics, Public Administration, Labor Economics and Industrial Relations, International Trade and Finance departments. In vocational colleges that provide education at the associate degree level, accounting education is given in detail mostly in the departments of accounting and tax practices. These departments aim to train qualified intermediate accounting personnel who will be directly involved in accounting practices, who can work directly in the accounting profession, both in financial consultancy offices and in the accounting departments of enterprises (Dalğar et al. 2011: 220-221).

Accounting is a science that uses a special language to communicate information to individuals or organizations interested in enterprises. The challenges that come with learning any foreign language may also apply to mastering this particular language used in accounting. Every student cannot learn the foundations and nature of the accounting language at the same level or in the same amount of time (Demir & Çam, 2006: 2-3).

The general accounting (financial accounting) course lays the groundwork for the stage of learning the things that accounting students need to know in order to participate in responsibilities linked to the accounting profession. At this point, student reluctance and unfavorable opinions about accounting are among the factors that make it challenging to comprehend the course and learn effectively (Akpınar & Yıldız, 2018: 92). Students who study accounting generally struggle to understand the fundamentals of accounting and have a poor opinion of the field because they believe it to be challenging and complex, and they only attempt to comprehend the essential ideas (Öztürk & Erdoğan, 2018: 178).

It is said that accounting is one of the hardest classes to study, and as a result, students struggle to achieve. The fact that the accounting course is predominantly based on numerical information and the use of legal information such as laws,

regulations and legislation in accounting may be the reasons why accounting is seen as a difficult course for students studying accounting. Students who take the accounting course have difficulties in comprehending and achieving accounting, their perspectives towards accounting change negatively and they experience anxiety (Varıcı & Bulut, 2015: 294). Students view accounting courses as mathematical. In addition to this feature, the verbal part of accounting courses should not be ignored. Therefore, the inability to comprehend both verbal and numerical concepts may have an impact on students' performance in the accounting course.

The literature has tackled accounting learning issues in a variety of ways. Demir and Çaçut (2021) used the interview technique to gather faculty members' comments in order to analyze the causes of the learning difficulties in accounting courses. According to the research, the following factors contribute to students' difficulties in accounting courses: a lack of interest in the course, a lack of exposure to the course prior to undergraduate studies, a preference for fields unrelated to the department, unfavorable advice from upperclassmen regarding the course, and the belief that they will fail. The questionnaire method was used by Demir and Çam (2006) to identify the elements that have a detrimental impact on accounting department students' performance in accounting courses. As a result, the students listed the fact that the lecturers conducted the courses with the idea that previous knowledge was sufficient, and the lack of concrete exercises and examples that would facilitate the comprehension of the content of the subjects integrated with the application as factors that negatively affected their success. Varıcı and Bulut (2015) examined students' negative attitudes and ideas about accounting during their accounting education and came to the conclusion that students' actions toward accounting courses change negatively when their anxiety levels rise. In a study on the personality qualities of accounting students, Karcioğlu et al. (2010) discovered a connection between the students' attitudes regarding the accounting profession and their personality traits. In addition to these findings in the literature, it can be argued that it is crucial to look into how students' success in accounting courses is affected by their view of the courses as being verbally or numerically complex.

## **2. Dyscalculia**

The word dyscalculia, which indicates poor calculation, is derived from the Latin word "calcular" (counting-calculation) and the Greek prefix "dis" (disordered-bad). The term dyscalculia is used in Turkish literature to refer to "math learning disorder" (Sezer & Akin, 2011). Dyscalculia can be defined as "impaired ability to see, express and understand numerical and spatial relationships" (Butterworth, 1999). Beacham and Trott (2005) and Butterworth (2003) both characterized dyscalculia as "a disorder or deficiency in understanding, writing and calculating mathematical relationships, as well as in recognizing, using, and writing numerical symbols." The World Health Organization defines dyscalculia as "a specific difficulty in the acquisition of simple numerical skills such as addition, subtraction, multiplication and division, rather than theoretical concepts such as algebra, trigonometry, geometry or analysis, which cannot

be explained solely by general mental retardation or inadequate education.” Based on all definitions, a general definition of dyscalculia states that “people have difficulty in understanding mathematical concepts and operations, although there is no difference in their intelligence level” (Ünal, 2017: 41).

The concept of dyscalculia was first defined by the Czech researcher Kosc (1974) as “difficulty in mathematics due to impairment in certain parts of the brain, including mathematical cognition, without a general difficulty in cognitive functions”. By clarifying the word “difficulty” in the definition, a correct understanding of mathematical learning disability can be ensured. Accordingly, Chinn (2004) said that the idea of difficulty is dependent on how the work at hand interacts with the attitudes and skills of the students. Chinn provided an illustration of the problem, indicating that a student with learning disabilities absorbs and processes the information slowly, yet one of the necessary conditions in mental arithmetic is to be able to complete the operation rapidly. In this way, he alluded to the challenge that arises when a student's abilities and the work and assignment that are required of them interact.

Characteristics of dyscalculia, a learning disability related to mathematics, is that it is distinct from low achievement and mental incompetence; it is permanent; the individual with dyscalculia struggles with basic mathematical concepts and abilities; and the degree of difficulty varies from person to person (Mutlu, 2016: 884-885). The conditions that influence people to have dyscalculia are due to internal and external factor. Internal factors include non-math factors such as anxiety, distraction, memory problems, hyperactivity and other learning difficulties. In terms of external factors, the factors that occur due to the person's environment such as family, school, environment, class, method can be given as examples. A person's risk of developing dyscalculia may rise when these factors interact (Olkun et al. 2012: 2).

Looking at the literature on the effect of dyscalculia on accounting education, Ünal in his study in 2017 aimed to reveal whether the academic achievement of students who took accounting courses for the first time in their undergraduate education is related to their academic achievement in the mathematics course they took during their undergraduate education. He studied the students' logical-mathematical intelligence, one of the multiple intelligences, and whether they had dyscalculia in order to achieve this purpose. The study's findings revealed that, contrary to what the students stated, their scholastic performance in mathematics—a fundamental science—had nothing to do with their success or failure in the accounting course. Aksu and Oral (2020) investigated the impact of university students' mathematical proficiency on their performance in accounting courses in a different study. Correlation analysis was used in an attempt to ascertain this relationship. The study's findings revealed no connection between students' proficiency in accounting courses and their mathematical knowledge levels.

### **3. Dyslexia**

When the lexical meaning of the concept is analyzed; the word dis (dys), which constitutes the word dyslexia, means that something is absent or difficult; the word

leksi (lexia) has the meanings of word, reading and language. Learning challenges in reading, decoding, spelling, and precisely and fluently understanding words are referred to as dyslexia. In summary, the concept of dyslexia means having a difficulty with words.

A person's general academic performance, job, income level, social and emotional well-being, and ability to continue their education are all impacted by dyslexia in addition to their ability to read words (Seçkin Yılmaz & Erim, 2019: 1103). Due to a combination of environmental and genetic factors, the brains of people with dyslexia are unable to absorb spoken information accurately and efficiently (Acar, 2018). Individual differences in dyslexia can be attributed to a variety of factors, including a person's structure, environment, familial support, length of education, and the impact of that education (Balci, 2017: 2).

Individuals of all IQ levels can experience dyslexia, according to research on the topic, and it has nothing to do with mental retardation. The cognitive processes that lead to these issues should be prioritized over issues pertaining to sound characteristics, according to explanations of dyslexia. In this regard, simultaneous processing becomes crucial since it is required to create a connection between relevant units at the reading comprehension stage and to provide meaning to the words read by incorporating these units into higher level units. Every reading stage involves the use of planning and attention processes, although the distinctions between these processes are increasingly noticeable in more difficult reading tasks (Saraç, 2014: 73). The idea of dyslexia should not be limited to difficulties with word reading; individuals may experience it to varying degrees. For instance, some dyslexics are completely unable to read, while others are able to read but struggle to understand what they read or read with words mixed together.

In a study by Heaton and Mitchel (2008), 43% of people with dyslexia were found through poor grades and grades in high school and beyond. The possibility that these individuals might have dyslexia was disregarded because they did not struggle with word reading in elementary school, making it impossible to identify them and delaying the implementation of potential interventions (Balci, 2017: 7-8). Even if a person is intelligent enough to succeed academically, their lack in "reading," one of the most fundamental abilities, might show up in other areas, and they are identifiable as academically failed (Townend & Turner, 1999; Hultquist, 2006). Because of this, a person's dyslexia diagnosis prior to receiving reading training becomes crucial. The process of reading comprehension issues varies. If dyslexia is identified early, even if a person struggles academically, their comprehension of what they read improves with time after half of the schooling process. Even while they perform better on oral examinations and are better at telling stories orally, they could struggle to master a second language. A person with dyslexia and high intelligence can succeed in certain courses, such as computers, graphics, art, and number-based fields, despite certain drawbacks (Selman et al. 2016: 172). Nowadays, there is a high probability of people experiencing dyslexia. The notion of dyslexia is widely recognized in developed nations, and the educational curriculum of these nations are built with this

understanding in mind. Accordingly, research on the concept of dyslexia is also increasing (Balci, 2017: 9). No studies have been conducted on the connection between dyslexia and accounting learning in the literature.

#### 4. Research

In this study, a quantitative approach was used to explore how learning difficulties, such as dyscalculia and dyslexia, affect students' experiences in accounting courses. At this point, it should be mentioned that dyscalculia and dyslexia scores do not offer a conclusive clinical diagnosis. They simply show symptoms and the degree of risk. One of the study's limitations is that the independent variables for dyscalculia and dyslexia were specified as self-reported dyscalculia and the degree of dyslexia symptoms, respectively. Participants included students who had taken accounting classes in different departments under the Faculty of Economics and Administrative Sciences at Muğla Sıtkı Koçman University. Ethical committee approval was obtained from the relevant institution in order to conduct the survey. To gather data, the researchers used a structured questionnaire. Surveys were conducted with students online and face to face. In sample selection, departments within the faculty where accounting courses are offered were identified as clusters. Participants were reached using the snowball sampling method, starting with student representatives and faculty members who shared the survey link within their respective departmental communication groups (e.g., WhatsApp, social media). This recruitment strategy allowed the survey to reach students from different departments who had either recently completed an accounting course or were currently taking one. The study population consisted of 3,463 students enrolled in accounting courses at Muğla Sıtkı Koçman University. Using a 95% confidence level and a 5% margin of error, the required minimum sample size was calculated as 311. In total, 373 valid responses were obtained. Although this corresponds to approximately 10.8% of the target population ( $N = 3,463$ ), the sample is considered adequate for the purposes of this study, particularly because participation was obtained from all major departments in the Faculty (Business Administration, Economics, Public Administration, Labor Economics and Industrial Relations, and International Trade and Finance), as reported in Table 1. This distribution helps reflect different academic tracks where accounting is taught and reduces the likelihood of department-based sampling bias. Participant characteristics were summarized using descriptive statistics and presented in Table 1. The table reports key background variables, including gender, department, and high school field of study.

Table 1. Demographic Characteristics Table

Variables	Frequency	Percentage
<b>Gender</b>		
Female	198	53,1
Male	173	46,4
Missing	2	0,5
<b>Department</b>		
Business Adm.	119	31,9

Economics	89	23,9
Public Administration	19	5,1
Labor Economics and Industrial Relations	68	18,2
International Trade and Finance	76	20,4
Missing	2	0,5
<b>High School Field of Study</b>		
Science	78	20,9
Mathematics and Social Sciences	268	71,8
Social Sciences and Humanities Track	15	4,0
Foreign Language Track	8	2,1
Missing	4	1,1
<b>High School of Graduation</b>		
Science High School	10	2,7
Anatolian High School	264	70,8
Vocational High School	54	14,5
Other	45	12,1

Table 1 summarizes the demographic characteristics of the students who participated in the study. The gender distribution is relatively balanced, with females (53.1%) slightly outnumbering males (46.4%). In terms of department distribution, the highest participation was observed in the Business Administration (31.9%) and Economics (23.9%) departments. Regarding high school fields of study, the "Mathematics and Social Sciences" track was the most represented, accounting for 71.8% of the participants, while other tracks had lower representation. As for the type of high school graduation, Anatolian High School graduates constituted the majority at 70.8%. These findings indicate that the sample demonstrates diversity across various demographic categories, although certain groups are more prominently represented. The descriptive statistics of the students' grades in the accounting course and the results of the normality test are presented in Table 2.

Table 2. Descriptive Statistics and Normality Test Results

Grades		Test of Normality			
		Kolmogorov-Smirnov		Shapiro-Wilk	
Valid	356	Statistics	Sig.	Statistics	Sig.
Missing	17				
Maximum	100	0,081	0,000	0,982	0,000
Minimum	6				
Mean	62,58				
Std. Deviation	14,88				
Skewness	-0,292				
Kurtosis	0,740				

The normality of the accounting course grades was evaluated using both formal statistical tests and descriptive indices. Although the Kolmogorov-Smirnov and Shapiro-Wilk tests yielded significant results ( $p < 0.001$ ), suggesting a departure from a perfectly normal distribution, it is well-documented in statistical literature that these formal tests are highly sensitive to even negligible deviations as the sample size increases ( $N=356$ ). Therefore, relying solely on these tests can be misleading for large datasets.

Following the framework provided by Tabachnick and Fidell (2013), the distribution was further examined using skewness and kurtosis coefficients. The analysis revealed a skewness value of -0.292 and a kurtosis value of 0.740. Since both values fall well within the strictly accepted range of  $\pm 1.5$ , the distribution of accounting grades was considered "approximately normal." This pragmatic approach justifies the use of parametric statistical procedures, as the observed distribution characteristics do not violate the underlying assumptions required for robust analysis in social sciences.

#### **4.1. Research Hypotheses**

1. *There is no significant correlation between self-reported dyscalculia and degree of dyslexia symptoms scale scores.*
2. *There is no significant relationship between the degree of dyslexia symptoms scale scores and students' performance in accounting courses.*
3. *There is no significant relationship between self-reported dyscalculia scale scores and students' performance in accounting courses.*
4. *There is no significant relationship between high school type and students' self-reported dyscalculia scale scores.*
5. *There is no significant relationship between high school type and the degree of dyslexia symptoms status.*

#### **4.2. Survey Instruments**

This study employed a structured questionnaire to examine whether dyslexia symptoms and self-reported dyscalculia are associated with students' academic performance in introductory accounting courses. The survey form included 45 items and was organized into three main parts. In the first part, participants provided demographic and educational background information such as gender, department, high school track, and high school type. Accounting performance was operationalized through students' reported numerical exam averages (HBN) from their introductory accounting courses (e.g., Financial Accounting I / General Accounting I), rather than letter grades. Because official transcript data could not be accessed due to anonymity and ethical constraints, participants were asked to check their scores using the university's grading system while completing the survey in order to reduce possible reporting errors. To assess dyscalculia-related symptoms, a 20-item scale adapted from the LDES-R2 (Learning Disability Evaluation Scale–Renormed, Second Edition) developed by McCarney and Arthaud (2007) was used. The scale has previously been applied in the Turkish context (Ünal, 2017), and its suitability for Turkish university students has been supported in recent work by Çetin and Öncel (2025), who reported a Cronbach's Alpha of 0.81 for the relevant domain. In the present study, the dyscalculia section was administered in a four-point Likert format ranging from "Never" to "Very Often," and it demonstrated excellent internal consistency ( $\alpha = 0.943$ ; see Table 3). Dyslexia symptoms were evaluated using a 20-item Yes/No checklist based on the revised adult dyslexia checklist (Vinegrad Test). The Turkish adaptation

for adult populations was provided by Güzelaydın (2016), and subsequent validation evidence for university-level samples was reported by Çetin and Öncel (2025), with an internal consistency coefficient of 0.76. In this study, the dyslexia checklist also yielded a high reliability coefficient for the current sample ( $\alpha = 0.912$ ).

As summarized in Table 3, both measurement tools exceeded the commonly accepted reliability threshold of 0.70, indicating that the scales produced consistent results within this research group. Overall, these reliability findings support the use of the LDES-R2 and Vinegrad-based checklist as appropriate screening instruments for evaluating learning difficulty symptoms in this academic context.

Table 3. Cronbach's Alpha Reliability Coefficient for Self-Reported Dyscalculia Items

Scale	Number of Items	Cronbach's Alpha
Dyscalculia (LDES-R2)	20	0,943
Dyslexia (Vinegrad Test)	20	0,912

## 5. Results

To test Hypothesis 1, a Spearman correlation analysis was conducted to examine the relationship between the degree of dyslexia symptoms and self-reported dyscalculia scale scores. The analysis revealed a negative and weak correlation between the degree of dyslexia symptoms and self-reported dyscalculia scale scores ( $r = -0.263$ ). Additionally, this relationship was found to be statistically significant ( $p = 0.000$ ). This finding indicates that Hypothesis 1 is rejected, suggesting that while the relationship is not strong, there is a significant association between the degree of dyslexia symptoms and self-reported dyscalculia. The results of the analysis are presented in Table 4.

Table 4. Correlation Analysis Results Between the Degree of Dyslexia Symptoms and Self-Reported Dyscalculia Scale Scores

Variable 1	Variable 2	Correlation Coef	Sig.	Sample Size
Self-Reported Dyscalculia	The Degree of Dyslexia Symptoms	-0,263	0,000	372

In line with Hypothesis 2, a Spearman correlation analysis was conducted to examine the relationship between the degree of dyslexia symptoms and accounting grades. The analysis revealed a very weak correlation between the degree of dyslexia symptoms and accounting grades, with a correlation coefficient of  $r = -0.006$ , and this relationship was found to be statistically non-significant ( $p = 0.908$ ). These results indicate that Hypothesis 2 is accepted, confirming that there is no significant relationship between the degree of dyslexia symptoms and accounting grades. The detailed results of the analysis are presented in Table 5.

Table 5. Correlation Analysis Results Between the Degree of Dyslexia Symptoms and Accounting Grades

Variable 1	Variable 2	Correlation Coef	Sig.	Sample Size
Acc. Grades	The Degree of Dyslexia Symptoms	-0,006	0,908	356

Hypothesis 3 was concerned, a Spearman correlation analysis was conducted to examine the relationship between self-reported dyscalculia scale scores and accounting grades. The analysis revealed a very weak correlation between self-reported dyscalculia scale scores and accounting grades, with a correlation coefficient of  $r = -0.047$ , and this relationship was found to be statistically non-significant ( $p = 0.345$ ). These results indicate that Hypothesis 3 is accepted, confirming that there is no significant relationship between self-reported dyscalculia and accounting grades. The detailed results of the analysis are presented in Table 6.

Table 6. Correlation Analysis Results Between Self-Reported Dyscalculia Scale and Acc. Grades

Variable 1	Variable 2	Correlation Coef	Sig.	Sample Size
Acc. Grades	Self-Reported Dyscalculia	-0,047	0,345	356

As part of testing Hypothesis 4, a Kruskal-Wallis H test was run to see whether self-reported dyscalculia scores differed depending on the type of high school students attended. When the results came in, no meaningful difference was found across the different school types ( $p = 0.160$ ). In simple terms, it looks like the kind of high school a student graduated from doesn't really affect their likelihood of scoring differently on the self-reported dyscalculia scale. So, Hypothesis 4 was accepted, meaning there's no strong link between high school type and self-reported dyscalculia. More detailed numbers and results can be seen in Table 7.

Table 7. Kruskal-Wallis H Test Results for Self-Reported Dyscalculia Scale Across High School Types

Test	Sig.	Decision
Kruskal-Wallis H Test	0,160	Retain the null hypothesis

Hypothesis 5 involved checking whether the type of high school students attended had anything to do with the presence of the degree of dyslexia symptoms. To do that, a Chi-Square test was used. The Pearson Chi-Square value turned out to be 46.461, with 48 degrees of freedom, and the p-value was 0.536 – far from being statistically significant. Another test, the Likelihood Ratio, gave almost the same result (Chi-Square = 46.615,  $p = 0.530$ ), backing this up. There was also a Linear-by-Linear Association test, which gave a Chi-Square value of 3.721 and a p-value of 0.054. This was close to the usual cutoff but still not quite significant. Overall, these findings all point to the same conclusion: there's no clear link between high school type and the degree of dyslexia symptoms, at least based on this data. A full breakdown of these results can be found in Table 8.

Table 8. Chi-Square Test Between High School Type and Presence of the Degree of Dyslexia Symptoms

Test	Chi-Square Value	Sig.	Decision
Pearson Chi-Square	46.461	0.536	Retain the null hypothesis
Likelihood Ratio	46.615	0.530	Retain the null hypothesis
Linear-by-Linear Association	3.721	0.054	Retain the null hypothesis

A hierarchical multiple regression analysis was conducted to determine the relative influence of dyslexia symptoms and self-reported dyscalculia on accounting grades, while controlling for demographic variables (Gender, Department, High School Track, and High School Type). In the first step (Model 1), demographic variables were entered into the model. The results showed that demographics alone did not significantly predict accounting performance ( $R^2=0.002, F(4,347)=0.173, p=0.952$ ).

In the second step (Model 2), dyslexia and dyscalculia scores were added to the model. The inclusion of these variables did not lead to a significant increase in the explained variance ( $\Delta R^2=0.004, \Delta F(2,345)=0.680, p=0.507$ ). Even when controlling for demographic factors, neither dyslexia ( $\beta=-0.057, p=0.307$ ) nor dyscalculia ( $\beta=0.016, p=0.776$ ) were significant predictors of accounting grades (see Table 9). These findings suggest that for this specific university population, learning difficulty symptoms do not have a dominant impact on introductory accounting success when other background factors are accounted for.

Table 9. Hierarchical Regression Analysis Predicting Accounting Grades

Predictors	B	Std. Error	$\beta$	t	p
<b>Step 1 (Constant)</b>	63.375	4.448		14.248	0.0001
Gender	-0.575	1.614	-0.019	-0.356	0.722
Department	-0.324	0.511	-0.034	-0.634	0.526
HS Track	-0.047	1.225	-0.002	-0.039	0.969
HS Type	0.424	1.136	0.020	0.374	0.709
<b>Step 2 (Constant)</b>	62.932	13.022		4.833	0,001
Dyslexia	-0.088	0.086	-0.057	-1.024	0.307
Dyscalculia	0.087	0.304	0.016	0.285	0.776
Model 1:	$R^2 = .022$	$F = .173$	$p = .952$		
Model 2:	$\Delta R^2 = .004$	$\Delta F = .680$	$p = .507$		

## 6. Conclusion

This study examined the relationship between dyslexia symptoms, self-reported dyscalculia, and academic performance in introductory accounting courses among undergraduate students at Muğla Sıtkı Koçman University. By testing five hypotheses, the research aimed to clarify whether verbal and numerical learning difficulty symptoms are associated with accounting achievement in a higher education setting. The results indicated a weak but statistically significant negative association between the degree of dyslexia symptoms and self-reported dyscalculia ( $r = -0.263, p < 0.001$ ). Although the magnitude of this relationship is limited, it suggests that these two learning difficulty profiles may co-occur to some extent while still reflecting distinct symptom patterns in adult learners. This finding supports the view that academic

support mechanisms should be designed in a differentiated manner rather than relying on uniform intervention approaches. The main outcome of the study is that neither dyslexia symptoms ( $r = -0.006$ ,  $p = 0.908$ ) nor self-reported dyscalculia scores ( $r = -0.047$ ,  $p = 0.375$ ) were significantly related to accounting grades. Consistently, hierarchical multiple regression results showed that after controlling for gender, department, high school track, and high school type, dyslexia and dyscalculia symptoms did not significantly predict accounting performance. In this sample, learning difficulty symptoms therefore did not emerge as direct determinants of formal achievement in accounting courses. Several factors may account for these findings. First, accounting education is structured around a systematic and rule-based logic, particularly through the double-entry system and standardized recording principles. Such a conceptual structure may reduce the dependence on rapid calculation skills or intensive reading fluency, functioning as a cognitive scaffold that supports students who experience difficulties in basic numerical or language processing.

Second, the participant group consists of students who have already reached the university level, which implies a certain degree of academic adaptation. It should also be noted that many students who reach university may have already learned how to cope with their own learning-related challenges. Over time, they may develop practical ways of studying that work for them (e.g., revising with summaries, using visual notes, repeating problem sets, or relying on structured routines). Such strategies can partly compensate for difficulties related to dyslexia or dyscalculia and may therefore reduce their observable impact on course grades in higher education.

Another point is that dyscalculia and dyslexia symptom levels did not differ significantly across high school types (dyscalculia:  $p = 0.160$ ; dyslexia:  $p = 0.536$ ). This pattern is compatible with the view that these difficulties are mainly neurodevelopmental and are not shaped primarily by the type of secondary school attended. For this reason, support in higher education should not be limited to specific student backgrounds. Instead, universities may benefit from adopting teaching and assessment practices that are accessible for different cognitive profiles.

The findings should also be interpreted in light of certain methodological limitations. Due to ethical anonymity requirements, accounting grades were collected through self-report. Although students were asked to confirm their scores using the university grading system, self-reported data may still include inaccuracies related to memory or reporting. Future research can improve the methodological side of this topic by relying on official transcript records instead of self-reported grades. Where possible, screening-based results may also be strengthened by adding clinically grounded assessment procedures. That said, the measurement tools used in this study performed well. Reliability was high for both scales (LDES-R2 dyscalculia:  $\alpha = 0.94$ ; Vinegrad-based dyslexia checklist:  $\alpha = 0.91$ ), which indicates that the items worked consistently within the current sample.

Looking at the overall pattern, accounting grades in this setting appear to be shaped less by symptom level alone and more by the way students study and by the structure

of the course itself. This point matters for practice. Instead of limiting support to general “inclusive education” statements, universities and accounting instructors may consider simple, direct interventions that students can actually use. Short sessions on study routines, problem-solving steps, or course-specific learning strategies may be especially helpful for students who feel they are falling behind.

From the teaching side, the course can also be made easier to follow by making its internal logic more explicit. Clear explanations of the accounting cycle, the rationale behind double-entry recording, and guided step-by-step examples reduce confusion and prevent students from getting lost in details. Visual materials—such as flowcharts, structured tables, and process diagrams—can further support learning, particularly when time pressure or text-heavy content becomes challenging. Finally, academic staff should keep in mind that learning difficulties may remain unnoticed at university level and may not necessarily present as an immediate or dramatic decline in grades.

In conclusion, although dyslexia symptoms and self-reported dyscalculia were observed among the participants, they did not significantly predict accounting grades in this sample. This suggests that a structured and concept-oriented accounting curriculum can support student achievement, even when learning difficulty symptoms are present. Future research should broaden the scope to multiple universities, use objective performance indicators, and examine which support practices—such as technology-assisted learning tools or peer-based models—are most effective for accounting education.

### **Contribution Rate and Conflict of Interest Statement**

All stages of the study were designed by the author(s) and contributed equally. There is no conflict of interest in this article.

### **Ethics Statement and Financial Support**

Ethics committee principles were followed in the study. Ethics Committee Report is required in the study. An ethics committee report with number 163, dated December 30, 2022, was acquired from the pertinent institution and forwarded to the editor in order to conduct the survey. The author(s) received no financial support for the research.

### **Use of Generative Artificial Intelligence and AI-Assisted Technologies in the Writing Process**

The author(s) did not use any AI tools during the preparation of this study. The author(s) assume full responsibility for the content of the publication under the AI tool usage declaration.

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