

Full Length Research Paper

Dyslexia in higher education

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The number of students with learning disabilities in post-secondary institutions has grown substantially, and those with dyslexia compile the largest subgroup. This study explores the utility conceptualization of dyslexia by analyzing the subjective experiences of 30 students from two 2-year institutions. Interviews confirmed that these students exhibited dyslexic traits, and the study findings indicated that they used a variety of approaches to succeed academically despite a perceived disability. None of the strategies used were related to repairing a phonological deficit. Instead, these students relied on the development of compensatory skills, e.g., internal strengths, to improve experiences and maximize learning performances.

Key words: Adult dyslexia, dyslexia, compensated dyslexic, dyslexic, learning disabilities.

INTRODUCTION

Current estimates indicate that 35 million Americans have a learning disability (LD), and dyslexia is by far the most diagnosed among all LDs (Zablotsky et al., 2019). However, this number is somewhat difficult to pin down, as people are often disinclined to admit they have problems with learning. The purpose of this research is to explore the utility of this medical conception of a learning difficulty as a deficit and the degree to which it may hinder the ability of students with an LD to succeed academically. Given that higher education is considered necessary for economic competitiveness, it seems reasonable to ask the question, 'how does research into LD deficits help students succeed academically?' A literature review revealed that research into LD deficits does address the key concerns for those who have dyslexia. In fact, such research may harm some students'

abilities to succeed in a higher educational setting. A closer look at dyslexia in higher education, the focus of this study, supports efficient conveyance of information to those who contend with an LD. As is the case with most communication, the transmitted message is the burden of the deliverer; the message bearer should make sure the receiver hears the intended message.

Subsequently, the argument is made that students taking higher education courses who possess dyslexic traits succeed when they use internal strengths rather than attempting to correct their phonological deficits. Furthermore, qualitative findings validate that a "dyslexic" or "learning-disabled" label is more likely to cause harm rather than improve academic outcomes. The following sections discuss the theoretical perspectives regarding LDs, followed by a specific discussion of dyslexia and its

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associated deficits. The discussion then turns to higher education and students who have an LD.

Theoretical perspectives of disability

There are three major perspectives on LDs that often guide the kinds of questions one may ask about a given disorder: the medical model, the minority group paradigm, and social constructivism (Brown and Broido, 2015). The medical model is perhaps the most used and is the foundation of how LDs, specific learning disabilities (SLDs), and dyslexia are defined. Thus, an LD is characterized by an abnormality that can and should be corrected through some type of intervention or cure (Brown and Broido, 2015; Lambert and Dryer, 2018; Moriña, 2017).

Since the advent of neuroimaging techniques, there has been a serious publication bias in favor of the “science” of psychological disorders. Subsequently, some researchers have moved away from the subjective experiences of those with these “disorders” and into a paradigm where the asymptomatic attempt is to find an underlying through cognitive neuroscience (Mayer, 2016). The ability to map the brain has led some researchers to focus exclusively on the underlying neurological correlates of LDs, specifically dyslexia. The current understanding of the brain and how its various mechanisms translate into human behavior is at its infancy, as is made evident by the brain mechanisms mentioned in the literature regarding dyslexia (Kearns et al., 2018; D’Mello and Gabrieli, 2018). Yeom et al. (2020) surmise the significance of the brain by stating “brain mechanisms have important academic and practical implications” (p. 1).

While all the information we can gain about dyslexia is welcomed, a medical perspective may not always be ideal, or even useful. For instance, how useful is a biological explanation for a condition that cannot be treated, such as in improving the academic performance of those who grapple with dyslexia? Bowers (2016) argues that it is not useful, and that neuroscience in its current form offers little insight in terms of teaching those who have dyslexia. It is easier to measure the capacities of students based on behavioral measures rather than brain images. In addition, and perhaps most importantly, effective instructional techniques often focus on *developing compensatory skills* rather than correcting deficits. Since the basis of neuroscientific inquiry rests on the comparison of “normal” brains to those that are “defective,” it can never assist in the development of an individual’s other internal capacities. When a person has a physical disability, such a permanent paralysis, rehabilitation seldom focuses on fixing the deficit, but rather on developing strategies to work around any shortcomings. Since there is no consensus about the biological basis of dyslexia (or any other LD), nor any sort of biological treatment, it makes little sense to

conceptualize that an intervention will correct the deficit. Thus, the focus on the medical model of learning disorders leads researchers to ask questions that are not useful in improving the livelihoods of individuals with dyslexia. However, the other two models view dyslexia less as a deficit and more as a difference.

The minority group (social group) paradigm argues that a disability should be characterized along the spectrum of normal human variation, and that those who have an LD are just one variant among many (Kong and Orosco, 2016). As a protected class in relation to civil rights—among ethical/racial, religious, or gender lines—minority group members receive protections that enable them to thrive within the general population. The minority group paradigm and constructivism similarly conceptualize those who have an LD or dyslexia as members of an oppressed group who deserve support. The social constructivist perspective argues that the conception of a “disability” is itself a social construct that can only be interpreted in opposition to a given social standard (Caliskan et al., 2017; Trent et al., 1998). The social construction paradigm accentuates collaboration between the facilitator and the learner, which aids the latter in appropriative interpretive experiences prompted by extrinsic stimuli (Vygotsky, 1978). Today, Vygotsky’s (1978) prophetic view of multicultural education, the infusion of diverse cultural beliefs and practices in the learning process, is highly significant.

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The minority group and constructivism models are useful in that they direct attention away from trying to “fix” what is supposedly “broken” in those who have an LD. The focus is no longer on merely finding strategies to improve learning outcomes, but on finding tools that enable students’ strengths to enhance learning outcomes. The discussion on dyslexia now turns to post-secondary education in the US, which is followed by a discussion of students with LDs in higher education.

Post-secondary education in the US

Higher education has long been considered one of the primary mechanisms by which disadvantaged populations can successfully compete economically in society. Its status as an arbiter of social justice is difficult to surpass. Some people view accessible post-secondary education as one of the only ways in which communities can promote economic opportunities for those who would not have them through other means. It is, therefore, disconcerting that large numbers of individuals who begin a post-secondary program never receive a degree.

According to the US Department of Education’s National Center for Education Statistics (USDE, 2017), only about 60% of the overall student population will receive a bachelor’s degree within six years of beginning

a four-year program. Broken down by race, these numbers are White, 63%; Hispanic, 53%; and Black, 40%. These rates are for enrollment in four-year institutions; however, completion rates vary significantly depending on the type of institution. When certificate programs and community colleges are included, the dropout rate increases to approximately 60% (USDE, 2017). These numbers reveal that, for reasons that are not completely clear, an exceptionally large number of individuals who begin college never finish. This is disturbing for at least two reasons. First, as mentioned before, higher education discontinuance severely harms people's ability to succeed economically. Second, post-secondary education benefits the economy as a whole; people with degrees are more likely to make technological advances or contribute directly to a robust economy for everyone (Alessandrini, 2018; Missingham, 2017).

While there are socioeconomic factors at play, the question remains as to why so many students who enroll in post-secondary education fail to receive a degree. Educators have been trying to answer this question for quite some time, and often further ask if ethnic and socioeconomic factors play a role. The statistics by race are mentioned above, but the attendance and completion gap between the lowest earners and highest earners is dramatic. Only 30% of individuals from the bottom income quartile are expected to enroll in college, compared to 80% in the top quartile, and those in the highest quartile are six times more likely to obtain a degree by age 25 (Goldrick-Rab et al., 2016). College preparedness seems to play a large role as well; students who are well-prepared before entering college are more likely to receive a degree, which likely contributes to the income disparity in achievement (Asghar et al., 2019).

Some scholars have argued that the rigid classroom structure in American education simply does not fit all people, particularly those with learning difficulties or from other countries (Waitoller and King Thorius, 2016). Further, some have argued that learning "disabilities" are rooted in social norms that favor certain types of learners over others (Waitoller and King Thorius, 2016). Recently, scholars have argued in support of culturally sustaining pedagogy (CSP) and a universal design for learning (UDL), concepts that will be explored in the next two sections (Waitoller and King Thorius, 2016).

Culturally sustaining pedagogy

The deficiencies among certain groups in the American educational system have existed since the beginning of mass education. Scholars have long attempted to develop different methods of teaching (pedagogies) that address the stark differences in ability and achievement across race, ethnicity, gender, and social class. In the 1960s, the dominant approach was what researchers

called "deficit" pedagogies (Sharma, 2018). This perspective rested on the assumption that if students did not perform well, it was so because they had a deficit in one ability or another, and the goal of the pedagogy was to make corrections (Sharma, 2018).

The next era of the 1970s and 1980s brought "difference" pedagogies (Sharma, 2018). In comparison to "deficit" pedagogies, difference pedagogies simply viewed cultural variations in language and learning as equal but different. This same era brought with it resource pedagogies that viewed the knowledge obtained through experience of a different culture as a resource to improve learning in the classroom. Then, in 1995, Gloria Ladson-Billings published a landmark paper titled "Toward a Theory of Culturally Relevant Pedagogy," wherein she laid out the framework for an idea that continues to strongly influence educational circles and scholarship (Ladson-Billings, 1995; Sharma, 2018). The goal of CSP is: to perpetuate and foster—to sustain—linguistic, literate, and cultural pluralism as part of the democratic project of schooling. In the face of current policies and practices that have the explicit goal of creating a mono-cultural and monolingual society, research and practice need equally explicit resistances that embrace cultural pluralism and cultural equality (Paris, 2012, p. 93).

The research targets of these scholars are marginalized groups such as ethnic minorities, women, and people with low socioeconomic status (SES). Systemically, educational institutions tend to cater to the learning styles and preferences of certain groups, which leave some groups at a serious disadvantage. The specifics of this theory and its application are beyond the scope of this paper; however, the point is that education is moving toward a more inclusive model than past models that had excessively rigid classroom structures. Such structures that relied on verbal forms of knowledge transmission have not proven to be universally effective.

Universal design for learning

A parallel body of literature has recently emerged in educational circles, focusing on a UDL model. This concept was based on architectural practices of the 1990s, which sought to ensure that even those with physical disabilities could have access to public spaces (Waitoller and King Thorius, 2016). The ideas behind UDL have since been applied to education. The central tenant of UDL is that any curriculum that is not designed with natural human variation in learning in mind is disabling to students. This concept turns "deficit" approaches on their head and asks the opposite question: how can one design a program so that all learning styles are accommodated? The theory behind UDL explicitly acknowledges that some people simply learn differently than others. Only a small number of

students acquire all new knowledge easily; in contrast, many students struggle to master new subjects, and most students will need support services at one time or another (Griful-Freixenet et al., 2020; Keefer, 2017; Missingham, 2017; Richardson, 2015).

Waitoller and King Thorius (2016) make a strong argument that those with LDs should be counted among marginalized groups targeted by CSP. They argue, cogently, that "disability" can only be conceptualized in opposition to "normalcy." That is, if a person is not able to perform a function in the usual way, then they are said to be "disabled." As discussed above, this has been the hallmark of educational pedagogies for decades and seeks to "correct" supposedly "incorrect" ways of doing (and in this case thinking). Waitoller and Thorius further argue that, for the most part, LDs should be considered part of natural human variation in learning, and that corrective efforts should focus on the delivery of the information, rather than on correcting a deficit in the learner.

Learning disabilities in post-secondary institutions

The number of students with LDs attending post-secondary institutions in the US is difficult to measure for several reasons. While physical disabilities are reported regularly, students with LDs (most of whom are dyslexic) often go unidentified. This is because in post-secondary education, students are required to self-disclose, and many have never been formally diagnosed, do not think they need to receive support, or fear being stigmatized (Griful-Freixenet et al., 2020; LDA, 2012; Lindsay et al., 2018; MacCullagh et al., 2016; NJCLD, 2011; Proctor et al., 2017; Sniatecki et al., 2018; Waterfield and Whelan, 2017). One large-scale analysis of 63,802 undergraduates at 11 four-year research universities showed that 5.96% self-reported an LD, and only about one-third of those reported receiving accommodations (McGregor et al., 2016). Of course, for the reasons mentioned above, this probably underestimates the actual number of students who are affected. Furthermore, it appears that many K-12 students who are diagnosed with an LD also belong to minority groups with even lower graduation completion rates (Chitiga, 2017).

According to some estimates, up to 15% of students enrolled in higher education have an LD (Bundock et al., 2019; Lipka and Hess, 2016; McMorris et al., 2019). Some studies show extraordinarily little difference in completion rates, but this may be the result of many students with disabilities self-selecting out of the endeavor before ever enrolling. Some research looks at completion for those who start a higher education program, while other researchers look at the raw number of degrees at a certain point after high school (Brown and Broido, 2015). In the last 20 years, post-secondary institutions have seen a massive increase in enrollment

for students with LDs, all of whom are guaranteed accommodations by Title II of the *Americans with Disabilities Act* (ADA, 1990). Some enrollments have been as high as tenfold (CEC SmartBrief, 2011; Chan, 2016; Moriña, 2017; Stevens et al., 2018).

However, scarce information assimilated in professional trainings (Clouder et al., 2016) and shared among colleagues regarding students with dyslexia in higher education hinders these students' academic and economic development. As Dr. Stephen Hawking, the world-renowned scientist, once said, "Disability need not be an obstacle to success. I have had motor neuron disease for practically all my adult life. Yet it has not prevented me from having a prominent career in astrophysics and a happy family life" (World Health Organization [WHO], 2011, p. ix). School dropouts are often the outcome of academic failure (Reisman and Severino, 2021), and the drop-out rate for students with LDs—most of whom are dyslexic—is estimated as high as 50% (Moriña, 2017). Reportedly, this percentage is not far from the dropout rate of the general population, making an even stronger argument that the dropout issue lies with the delivery of academic information, rather than with the students themselves. Moreover, the provision and receipt of adequate support available to identifiable students with dyslexic traits in higher education is also an opportunity to support all students, especially those who are not diagnosed.

Learning disabilities

A disability is defined as "any condition of the body or mind (impairment) that makes it more difficult for the person with the condition to do certain activities (activity limitations) and interact with the world around them (participation restrictions)" (Centers for Disease Control and Prevention, 2019, para. 1). Documented evidence of disabilities dates to the Middle Ages (Galer, 2014; Godden and Hsy, 2013). Oliver et al. (2012) discussed the modern conceptualization of disability as they distinguished the biomedical perspective from the social perspective. In the former, a disability is a problem that needs to be fixed, while in the latter, society acknowledges the limitations of people with disabilities. Sam Kirk is credited with coining the term "learning disabilities" in a Chicago meeting with parents and professionals held in 1963 (Kirk, 2009). Kirk (2009), in citing W. D. Kirk, defined an LD as "a psychological or neurological impediment to perceptual or communicative disorder" (p. 25). An earlier definition by Kirk and Elkins (1975) added reading deficits to the definition of an LD. While these were the first published definitions, many more have been published since. The Educator's Diagnostic Manual of Disabilities and Disorders defines an LD as a neurobiological disorder that includes specific difficulties in reasoning, reading, writing, listening,

speaking, or math (Pierangelo and Giuliani, 2007).

Additionally, the literature recognizes SLDs, which are defined by the US Department of Education (2012), as the imperfect ability to "listen, think, speak, read, write, spell, or do mathematical calculations" (Para. 1). WHO defines SLDs as "impairments in information processing resulting in difficulties in listening, reasoning, speaking, reading, writing, spelling, or doing mathematical calculations – for example, dyslexia" (WHO, 2011, p. 309). Perhaps one of the more complete definitions comes from the reauthorization of the Individuals with Disabilities Education Act (IDEA) in 2004, which states: "The term 'specific learning disability' means a disorder in 1 or more of the basic psychological processes involved in understanding or in using language, spoken, or written, which may manifest itself in the imperfect ability to listen, think, speak, read, spell, or do mathematical calculations. Such term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such a term does not include a learning problem that is primarily the result of a visual, hearing, or motor disabilities; of mental retardation; of emotional disturbance; or environmental, cultural, or economic disadvantage (USDE, IDEA, 2004, §602.30, 2012).

Two major themes stand out in these definitions. First, the person has problems learning material that cannot be explained because of their sensory perception, second, the preceding definitions center on the measurement of some "deficit" that exists compared to "normal" learners. While this may be a reasonable way to conceptualize LDs in some contexts, with further exploration, it becomes clear that this is not the only way to think about LDs and SLDs, and that how they are conceptualized can have real-world consequences for individuals with LDs and SLDs. In the next section, dyslexia will be defined, followed by theoretical considerations surrounding how LDs are defined and diagnosed.

Dyslexia

Defining dyslexia is even more problematic. The recent update to the DSM-V no longer contains separate diagnostic criteria for dyslexia; it is now lumped with other SLDs and allows the person doing the diagnosis to make a specific recommendation (ADA, 2013). Further, as no two individuals exhibit identical symptoms, defining and identifying dyslexia has been the subject of extensive debate. While there are established indicators for children, the focus of this study is on adult dyslexia and, therefore, on the symptoms experienced in adulthood.

Many authors have described the characteristics of dyslexia. While there is some overlap, some of the definitions include characteristics that others do not. Proctor et al. (2017) list the following as identifying behaviors related to dyslexia: a tendency to exhibit intensity in reading and writing tasks, and an inadequate

command of vocabulary skills and perhaps recall. However, individuals who exhibit symptoms of dyslexia can also be very competent in oral language, have good intuition and people skills, and generally be very apt at reading people. The Learning Disabilities Association of America (LDA, 2012) also lists what they consider to be the most prevalent characteristics of dyslexia; people may read well but not write well (or vice versa), may be able to learn information in one way but not another, may have a short attention span, be impulsive, or easily distracted, and may have difficulty following directions, especially directions with multiple steps. These definitions are not identical, but each allude to the various characteristics one may find in any given individual with dyslexia. However, the ambiguity of these definitions highlights the perceptual imprecision of the term as well as a judgment perspective.

Diagnoses

Despite the widespread prevalence of dyslexia diagnoses, there is disagreement regarding the actual nature of the condition. Some researchers argue (and have tried to demonstrate) that the root of dyslexia is in phonological processing (Saksida et al., 2016). Other research suggests that dyslexia is a combination of phonological processing and problems with executive functioning (which encompasses working memory, planning, inhibition, and set-shifting (Smith-Spark et al., 2017). Still, other researchers posit a deficit in implicit learning, such as the ability to detect patterns that are not made explicit, as in the early development of language skills (Kahta and Schiff, 2016). Others, such as Elliott and Grigorenko (2014) argue that because all types of reading disorders respond to the same types of interventions (that is, phonological interventions), it makes no sense to single out some students as having a disorder and others as only having a problem with reading. Their point is that if the interventions are the same, why diagnose someone with a neurocognitive "deficit?" As will be discussed later, it may not be useful to diagnose individuals as having a disorder, as it may not change the interventions used, but may instead serve to stigmatize and single out certain individuals in a higher educational setting.

Furthermore, some individuals cope with their dyslexic traits very well and, ironically, many even excel in diverse venues despite them (Deacon et al., 2012; Eide and Eide, 2011; Kemp et al., 2009; Swanson et al., 2014). Sometimes labeled as compensated or high-functioning dyslexics (Deacon et al., 2012, p. 121), such people of exceptionality cannot be normalized. They are distinct; a more precise label is "differentia." *Differentia* distinguishes one entity from another, and attests to these remarkable individuals and how they counterbalance their dyslexic traits (Richardson, 2015). The mode of learning for such individuals is different, but they compensate to succeed.

These individuals are neither linear strategists nor conformists, yet they are highly methodological, creative, and known for thinking outside of the box.

The present study

The goal of this research is to explore the subjective experiences of post-secondary students with dyslexic traits. Two research questions were addressed: (1) What strategies do students with dyslexia use to cope with their various learning issues, and (2) How has the dyslexic label affected their post-secondary experiences? By exploring the experiences of college-aged students with dyslexia, one can begin to unravel what allows these students to succeed and why they may fail. The findings will provide insight into the proper conceptualization of dyslexia and its relation to learning for students with and without the *deficit*. The study was designed to identify the degree to which LD strategies focus on developing compensatory skills rather than correcting deficits. Furthermore, exploring the impact of the label on students' experiences may provide some insight into its usefulness in terms of improving academic achievement and outcomes.

MATERIALS AND METHODS

This study used a qualitative critical-ethnographic research design to explore the lived experiences of college students with dyslexic traits.

Participants

The participants were 30 students from two 2-year institutions. The sample consisted of 17 women and 13 men, ranging in age from 19 to 47 years. The inclusion criteria used to select participants were as follows: (a) current enrollment in a post-secondary education program, and (b) a perceived LD (diagnosed or not). To determine if the students were possible participants and whether they had probable dyslexic traits, the researcher asked them three questions: (1) Do you tend to switch numbers and/or letters around when writing; (2) When you are talking, do you often have a difficult time trying to find the right word to say; and (3) Do you often change topics in the middle of a conversation? Students who responded "yes" to any two of the three questions were invited to participate in the study. While controversy exists over appropriate dyslexic assessment methods (Elliott and Grigorenko, 2014), this study's qualification questions were derived from the literature, which describes these constructs as dominant traits of dyslexia.

Instrumentation

The interview protocol for this study was semi-structured, which left room for modifications based on how participants responded. The interview protocol was designed to elicit four types of information from the students: (1) background, (2) academic experiences, (3) use of institutional resources, and (4) use of personal academic strategies and tools.

Interview questions

1. Describe your learning challenges associated with dyslexia and the impact on your college academic performance.
2. What strategies have you developed to help you with your college studies?
3. What types of academic support are available to you at your college?
4. What college supports or college services have you used to help you academically?
5. Tell me about your journey in college; how are you doing academically?

All interview questions and participants' responses were provided audibly.

Sampling

A nonrandom sample was gathered for this study so that participants could provide the desired information. No formula was used to determine sample size; however, according to standards established by Hancock et al. (2016), a sample size between 12 and 60 is sufficient to reach data saturation in qualitative studies. Subsequently, 30 participants were included in the study.

Interview process and data collection

The actual number of interviews conducted was 31; however, one female student was excluded because she had already obtained a bachelor's degree at the time of the interview and was simply taking a refresher course. The researcher used previous background in teaching students with LDs at both secondary and post-secondary institutions to develop the proprietary interview protocol. The protocol consisted of five questions. Question 1 had two parts, and Question 4 presented a dichotomy. The interview questions were asked sequentially. The questions were piloted with volunteers who were not included in the study. All interviews were transcribed.

Validity and reliability

Three areas of validity were addressed: face, construct, and content. Face validity, which determines whether the instrument measures what it claims, was performed by developing a succinct and thorough interview protocol that helped to prevent possible misunderstandings among the participants regarding the study's focus. Construct validity, which tested for theoretical dyslexic experiences, was addressed in two ways: (1) participants were made aware of the study's intent, which helped to direct their responses, and (2) participants aligned their responses with a specific research question. Since few studies exist on students with dyslexia in postsecondary settings, content validity, which guarantees a thorough representation of the construct, was determined by an extensive literature review that necessitated additional analysis of students with dyslexia in secondary education settings.

Relative to reliability, the researcher prepared a short PowerPoint (PPT) to assist in the interview process. The PPT eliminated paper rustling and non-related conversations, and enabled participants to focus on a specific question. The PPT also allowed participants the opportunity to see each question and prepare to respond.

Data analysis

NVivo was used to transcribe the data and analyze it for themes. Deductive analysis was conducted to extrapolate themes,

aggregate interviews, and enable narrative generation. Inductive analysis was used to extrapolate the intention of participants for whom small details were left out. The process consisted of transcribing data, cleaning data, identifying themes, solidifying nodes, and interpreting data.

RESULTS

Evidence from post-secondary students who show no signs of dyslexic traits indicates that there is a fundamental flaw in the approach taken toward teaching students in higher education. Namely, the existing one-size-fits-all academic approach poses a problem for more than just students with LDs.

Based on previous theories and research, the researcher expected to find the following: (1) students employ mechanisms that utilize their strengths to succeed (rather than trying to correct their deficits), and (2) the dyslexic label has done more harm than good in terms of improving academic outcomes and progress. Analysis of interview responses indicated that 16 of the 30 respondents had undergone a formal assessment for dyslexia at some point in their lives. Fourteen participants had no previous formal assessments.

Question 1: Academic challenges and impact on experience

This question was divided into two parts. Findings for the first part of the question revealed that the dominant challenges participants faced were associated with reading, distractions, and/or switching letters and numbers, whereas the second part assessed the impact of those challenges on postsecondary education.

Part 1: Challenges

Reading: The challenge participants mentioned most often was reading. Of the total sample, 60% ($n = 18$) mentioned having to re-read materials, and of these, nine participants (female, $n = 6$; male, $n = 3$) mentioned that they needed to read materials two or three times. Five participants (female, $n = 3$; male, $n = 2$) mentioned re-reading materials four or five times to comprehend it, while four participants (female, $n = 2$; male, $n = 2$) said they needed to re-read materials six times or more. For many participants, these problems were associated with comprehension, transposing letters or words, or over-anticipating by allowing their minds to think ahead of what they were going to read.

Distractibility: The second most common challenge was distraction. Twenty-one (female, $n = 11$; male, $n = 10$) participants indicated they found paying attention to be incredibly challenging. Nine students (female, $n = 3$;

male, $n = 6$) mentioned being easily distracted in class. This indicates that people with dyslexia are easily distracted by changes in their surroundings (Davis and Braun, 2010; LDA, 2012).

Other challenges: Participants said they reversed letters (female, $n = 3$), and/or reversed numbers (female, $n = 5$; male, $n = 1$). Six respondents (female, $n = 5$; male, $n = 1$) mentioned that they switched around whole words while reading or writing. Six female respondents reported that they had experiences where they knew what they wanted to say but were temporarily unable to access the correct word when speaking or writing. Additionally, six female participants noted that they experienced problems when recalling words and details. Two participants, one female and one male, indicated that they tended to write essay paragraphs out of sequence, and then switched them around. One student said she was able to read silently, but had difficulty reading aloud.

Part 2: Impact of dyslexia on college experiences

In part two of Question 1, participants acknowledged experiencing both positive and negative consequences of their dyslexic traits, but the primary experiences were negative for most respondents. The barriers participants noted were either internal (e.g., embarrassment, fear, and/or insecurities) or external (e.g., discontinuity, non-nurturing environments, lack of presence, and/or resource deficits). Respondents also raised concerns regarding social stigma and labeling. Many reported experiences that left them feeling embarrassed in academic settings. Notably, the effects of being labeled have a lot to do with one's self-image (Pino and Mortari, 2014). The internal barriers participants experienced the most were personal embarrassment (female, $n = 6$; male, $n = 3$) and fear (female, $n = 4$; male, $n = 3$). Only three participants mentioned feeling academically insecure and claimed they did not answer a previous written or verbal question because of past mistakes, which made them doubt their intellect and ability.

Academic barriers: Learning new material is a challenge for any student; however, it was hypothesized that students with dyslexia would have more problems associated with institutional barriers (Clouder et al., 2016). Findings have supported this hypothesis. Some of the barriers documented in the literature include discontinuity, a non-nurturing environment, a lack of presence, and a lack of resources (Lambert and Dryer, 2018). Six students reported issues with discontinuity (female, $n = 4$; male, $n = 2$). In addition, 67% of the female students ($n = 13$) mentioned a non-nurturing academic environment. Interestingly, no male participants mentioned a non-nurturing environment, which could be attributed to gender differences. No student reported a

lack of presence, and only one female student mentioned a lack of resources.

Question 2: Helpful academic strategies

Learning styles: Respondents indicated that a wide variety of strategies and learning styles helped them cope with the rigorous coursework associated with post-secondary education. Overall, six learning modalities have been identified as possible mechanisms for students with dyslexia to improve comprehension: visual, auditory, analytic, tactile, kinesthetic, and global. Three of these modalities stood out among the participants: visual ($n = 20$; 12 female, 8 male), auditory ($n = 11$; 6 female, 5 male), and analytic ($n = 10$; 5 female, 5 male). Earlier studies by Pashler et al. (2009), Chick (2010), and Xu (2011) acknowledged the non-existence of evidence validating the claim that providing opportunities for students to use their preferred learning styles improves learning. In contrast, studies with diverse ethnic groups indicate that preferred learning styles can be understood to be among students' strengths (Richardson, 2015; Widharyanto and Binawan, 2020). Moreover, according to Stienen-Durand and George (2014), "it may be beneficial to consider dyslexia as an alternative learning style" (p. 420).

Some participants explained that it is difficult for them to focus on content that is not presented in their preferred modality. Some reported an inability to focus on information that is not presented either visually or auditorily, thus making learning through reading quite difficult for these students.

Academic tools: The most cited learning strategies among participants were note-taking, reading, and asking for help. Twenty-two participants (73%) used some form of note taking as a learning strategy. The strategies associated with this tool were index cards, post-it notes, and highlighters. Students also cited effective strategies they employed when reading, with the next most cited learning strategy being reading out loud, followed by rereading the material several times. Other strategies consisted of interacting with the text with objects such as rulers or the participant's hands, reading the subtitles, or organizing based on bold text in the reading material.

Questions 3 and 4: Types of support available and used by participants

There are two types of support available to students with disabilities: provisions and accommodations. Provisions are physical facilities meant to aid students, such as libraries, tutoring centers, and computer labs. These also include human resources, such as teachers, other students, and counselors. Accommodations consist of services such as disability testing, note-taking assistance,

or assisted technology.

The analysis revealed that 80% of participants knew of and used the provisions available on campus, while only 43% knew of and used accommodations. According to MacCullagh et al. (2016), one accommodation often utilized is that of time-and-a-half offered during test-taking. In contrast, Pino and Mortari (2014) posited that "alternative assessment modalities" provide better test taking options (p. 361). Nevertheless, it is obvious from data in the present study that accommodations were not well known and were in fact underutilized by the participants. Notably, the interviews indicated that the students who used academic accommodations found them extremely useful and helpful. Several respondents indicated that they did not feel they would be able to succeed in higher education without access to these accommodations.

Question 5: College journey and academic standing

Only 18 participants (female, $n = 10$; male, $n = 8$) voluntarily revealed their grade point average during the interviews, while an additional four gave a subjective estimate of their current standing. From these results, it was difficult to determine an overall perspective on academic standing among participants. Without knowing the academic performance levels of all the students who participated in the interviews, it was difficult to say if they performed better or worse, on average, than other students. It was also difficult to ascertain the degree to which the use of accommodations or learning strategies impacted students' academic success.

Character traits: Some students (female, $n = 1$; male, $n = 4$) cited internal character traits as cognitive strengths that helped them succeed academically. The three most cited traits were perception (female, $n = 3$; male, $n = 13$), persistence (female, $n = 9$; male, $n = 4$), and resiliency (female, $n = 7$; male, $n = 4$). Perception is characterized by heightened imagination, metacognition, and altered perception. LoGuidice (2008) indicates that intuitiveness has a strong association with perception. Persistence and resiliency broadly refer to being able to overcome challenges. Resilience enables post-secondary students with dyslexia to manage their academic challenges (MacCullagh et al., 2016).

Other internal strengths: Eight participants (female, $n = 1$; male, $n = 7$) specifically mentioned using imagination as a learning tool. Five students (female, $n = 1$; male, $n = 4$) indicated that they thought in pictures, and two more mentioned thinking intensely about academic tasks. Seven participants (female, $n = 2$; male, $n = 5$) reported that they used their visual imagination, or creativity, to help them learn new material. Three noted they were known for their creative ideas. Entrepreneurs, engineers, and artisans are a few careers where adults with dyslexia

often thrive because of their creative abilities (LoGuidice, 2008; Sunday, 2015). The creative driving force is neurobiological hyper-order brain activity (Pierangelo and Giuliani, 2007; Richardson, 2015), which functions at rapid speeds (Moore, 2014). Research recognizes the “multiple hypo theses” relative to dyslexic deficits (D’Mello and Gabrieli, 2018). However, new studies on adults with dyslexia yield findings that report an additional narrative, one that centers on dyslexic creativity and not conformity.

DISCUSSION

Students reported a variety of internal challenges associated with attending higher educational institutions, such as reading difficulties, distractibility, switching letters and numbers, and short-term memory problems. Some students also reported knowing what they wanted to say but being unable to access the correct words to write or speak in a timely manner. Students reported feelings of embarrassment, fear, and insecurity associated with attending post-secondary institutions. Many students reported having negative experiences previously, which made them insecure about their abilities.

Despite these and other challenges, several reported that an internal driver propelled them to pursue their post-secondary goals. Thus, these students were very adept and creative in the strategies they used to overcome their challenges. Many had developed an understanding of their learning styles through experience and actively used them to improve their comprehension of course materials. Students reported utilizing visual aids, note-taking, using their imagination, tutoring, reading aloud, rereading material, and physically interacting with coursework to improve their knowledge retention.

As explained above, literature on LDs tends to focus on the “deficit” aspect of disorders and seeks to expose the qualities that are lacking in comparison to “normal” individuals. This is the nature of disorders in general, as they can only be conceptualized in terms of a standard “normal” benchmark. However, it is clear from the responses of the individuals interviewed in the present study that the strategies used to overcome their weaknesses did not involve correcting what was “wrong,” but were centered on compensating by developing other strengths.

It is also clear from these interviews that, despite massive challenges, students can do well in a post-secondary environment. Although only about half of the students provided details regarding their academic performance, few reported not doing well enough to pass. If students with a “disability” can perform well by employing certain learning strategies, and the retention rate for higher education is only about 60% overall, does it make sense to classify these students as “disabled?” All students do not learn new material easily and benefit from receiving extra help (Richardson, 2015). Research

indicates that prior knowledge aids reading, comprehension, and retention (Reisman and Severino, 2021). Therefore, many of the resources and strategies used by students with LDs could be particularly useful if made available to the general student population and may very well improve the graduation rate for all students.

Accordingly, this researcher advocates for a paradigm shift. The expectation among many students is that lectures and readings are sufficient to learn course material. However, students who succeed academically often engage much more actively with their studies, and this was common among the students in this study who grapple with dyslexia. Perhaps what is needed is a change in the conceptualization of the learning environment to accommodate learners of all types (e.g., UDL). This would save students with LDs from the social and psychological repercussions of being labeled “disabled” and make higher learning much more accessible to all students.

The implications of the present study for stakeholders—students, teachers, support staff, and politicians—can be summed up accordingly. The higher educational environment should be nurturing and provide adequate accommodations (e.g., supports and assistive technology) that are clear, repeatedly advertised, and accessible. Academic success in higher education for students who contend with dyslexia necessitates UDL. Griful-Freixenet et al. (2020) validated the essentiality of implementing different forms of representation (information delivery), engagement (interactive participation), and expression (competency performance). Students who have dyslexic traits should also have the freedom to utilize their inner strengths, rather than be forced into struggling to fit the mold of traditional, standardized educational development.

The limitations of this study are those inherent in qualitative studies. The researcher did not use a formal diagnostic tool to assess participants' status as dyslexic or require participants to be formally diagnosed. The non-experimental nature of this study makes it difficult to compare these students to the general population. Self-reports are not always reliable (Reisman and Severino, 2021). The strategies used for analysis carry the possibility of experimenter bias, as the researcher's judgment is a factor. Future research could explore this concept more experimentally by comparing the challenges and strategies used by students with and without LDs. Further, since extraordinarily little research exists on adults with dyslexia, researchers should also attempt to assess the actual academic impact of the disorder more rigorously, focusing on developing compensatory skills rather than on correcting deficits.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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REFERENCES

- Alessandrini D (2018). Is post-secondary education a safe port and for whom? Evidence from Canadian data. *Economics of Education Review* 67:1-13. <https://doi.org/10.1016/j.econedurev.2018.09.005>.
- American Psychiatric Association (ADA) (2013). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. Washington, D.C: American Psychiatric Association.
- Americans with Disabilities Act (ADA) (1990). -42 U.S.C. §12101(a)(3). Retrieved from <http://www.ada.gov/pubs/adastatute08.htm#12112>
- Asghar Z, Williams N, Denney M, Siriwardena AN (2019). Performance in candidates declaring versus those not declaring dyslexia in a licensing clinical examination. *Medical Education* 53(12):1243-1252. <https://doi.org/10.1111/medu.13953>.
- Brown K, Broido EM (2015). Engaging students with disabilities. In: S. J. Quaye, & S. R. Harper (Eds.), *Student Engagement in Higher Education: Theoretical Perspectives and Practical Approaches for a Diverse Population*. New York, NY: Routledge pp. 186-207.
- Bowers JS (2016). The practical and principled problems with educational neuroscience. *Psychological Review* 123(5):600-612. <https://doi.org/10.1037/rev0000025>.
- Bundock K, Hawken LS, Kihara SA, O'Keeffe BV, O'Neill RE, Cummings MB (2019). Teaching rate of change and problem solving to high school students with high incidence disabilities at tier 3. *Learning Disability Quarterly* 44(1):35-49. <https://doi.org/10.1177/0731948719887341>.
- Caliskan ZZ, Simsek H, Kondakci Y (2017). The differentiated function of school in socio-culturally disadvantaged context: A constructivist grounded theory study from Turkey. *Urban Review* 49(3):400-419. <https://link.springer.com/article/10.1007/s11256-016-0391-8>.
- CEC SmartBrief (2011). -More students with cognitive disabilities are attending Mich. Colleges." Retrieved from <https://cec.sped.org>.
- Centers for Disease Control and Prevention (CDC) (2019). -Impairment, activity limitations, and participation restrictions." Retrieved from: <https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html>
- Chan V (2016). Special needs: Scholastic disability accommodations from K-12 and transitions to higher education. *Current Psychiatry Reports* 18(2):21. <https://link.springer.com/article/10.1007%2F11920-015-0645-2>
- Chick N (2010). -Learning styles." Vanderbilt University Center for Teaching. Retrieved from <https://cft.vanderbilt.edu/guides-sub-pages/learning-styles-preferences/>
- Chitiga M (2017). Punished for being normal! A culturally relevant critique of the deviant behaviors of minority millennials. *International Journal of Learning, Teaching, and Educational Research* 16(12):108-121. <https://doi.org/10.26803/ijlter.16.12.7>
- Clouder L, Adefila A, Jackson C, Opie J, Odedra S (2016). The discourse of disability in higher education: Insights from a health and social care perspective. *International Journal of Education Research* 79:18-20. <http://dx.doi.org/10.1016/j.ijer.2016.05.015>.
- Davis RD, Braun EM (2010). *The Gift of Dyslexia: Why Some of the Smartest People Can't Read and How They Learn*. New York, NY: Penguin Group.
- Deacon SH, Cook K, Parrila R (2012). Identifying high-functioning dyslexics is self-report of early reading problems enough? *Annals of Dyslexia* 62(1):120-134. <https://doi.org/10.1007/s11881-012-0068-2>.
- D'Mello AM, Gabrieli JDE (2018). Cognitive neuroscience of dyslexia. *Language, Speech, and Hearing Services in Schools* 49(1):798-809. https://doi.org/10.1044/2018_LSHSS-DYSLC-18-0020
- Elliott JG, Grigorenko EL (2014). *The Dyslexia Debate*. NY: Cambridge University Press.
- Eide BL, Eide FF (2011). *The Dyslexic Advantage: Unlocking the Hidden Potential of the Dyslexic Brain*. New York, NY: Penguin Group.
- Galer D (2014). A social history of disability in the middle ages: Cultural considerations of physical impairment. *Disability and Society* 29(1):163-165. <https://doi.org/10.1080/09687599.213.856677>
- Godden R, Hsy J (2013). Analytical survey: Encountering disability in the middle ages. *New Medieval Literatures* 15:313-339. <https://doi.org/10.1484/j.nml.5.103458>
- Goldrick-Rab S, Kelchen R, Harris DN, Benson J (2016). Reducing income inequality in educational attainment: Experimental evidence on the impact of financial aid on college completion. *American Journal of Sociology* 121(6):1762-1817. <https://doi.org/10.1086/685442>
- Griful-Freixenet J, Struyven K, Vantieghem W, Gheysens E (2020). Exploring the interrelationship between universal design for learning (UDL) and differentiated instruction (DI): A systematic review. *Educational Research Review* 29:100306. <https://doi.org/10.1016/j.edurev.2019.100306>
- Hancock ME, Amankwa L, Revell MA, Mueller D (2016). Focus group data saturation: A new approach to data analysis. *Qualitative Report* 21(11):2124. <https://search.proquest.com/openview/df220566b53a6853f15ac561b7af91b1?pq-origsite=gscholar&cbl=55152>.
- Kahta S, Schiff R (2016). Implicit learning deficits among adults with developmental dyslexia. *Annals of Dyslexia* 66:235-250. <https://doi.org/10.1007/s11881-016-0121-7>.
- Keefe N (2017). The persistence of deficit thinking among social studies educators. *Journal of Social Studies Education Research* 8(3):50-75. <https://jsser.org/index.php/jsser/article/view/231>
- Kearns DM, Hancock R, Hoefft F, Pugh KR, Frost SJ (2018). The neurobiology of dyslexia. *Teaching Exceptional Children* 51(3):175-188. <https://doi.org/10.1177/0040059918820051>.
- Kemp N, Parrila R, Kirby JR (2009). Phonological and orthographic spelling in high-functioning adult dyslexics. *Dyslexia* 15:105-128.
- Kirk SA (2009). Specific learning disabilities. *Journal of Clinical Child Psychology* 6(3):23-26. <https://doi.org/10.1080/15374417709532776>
- Kirk SA, Elkins J (1975). Characteristics of children enrolled in the child service demonstration centers. *Journal of Learning Disabilities* 8(10):630-637.
- Kong JE, Orosco MJ (2016). Word-problem-solving strategy for minority students at risk for math difficulties. *Learning Disability Quarterly* 39(3):171-181. <https://doi.org/10.1177/0731948715607347>
- Ladson-Billings G (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal* 32(3):465-491. <https://doi.org/10.3102/00028312032003465>.
- Lambert DC, Dryer R (2018). Quality of life of higher education students with learning disabilities studying online. *International Journal of Disability, Development, and Education* 65(4):393-407. <https://doi.org/10.1080/1034912X.2017.1410876>.
- Learning Disabilities Association of America (LDA) (2012). *Adults with learning disabilities: Assessing the problem.* Retrieved from <https://ldag.org/adults/adults-learning-disabilities/>
- Lindsay S, Cagliostro E, Carafa G (2018). A systematic review of barriers and facilitators of disability disclosure and accommodations for youth in post-secondary education. *International Journal of Disability, Development, and Education* 65(5):526-556. <https://doi.org/10.1080/1034912X.2018.1430352>
- Lipka O, Hess I (2016). Attitudes toward statistics studies among students with learning disabilities. *Numeracy: Advancing Education in Quantitative Literacy* 9(2):1-17.
- LoGuidice KR (2008). *Common Characteristics of Adult Dyslexia*. Amesbury, MA: New England Dyslexia Solutions.
- MacCullagh L, Bosanquet A, Badcock NA (2016). University students with dyslexia: A qualitative exploratory study of learning practices, challenges and strategies. *Dyslexia* 23(3-23):1-23. <https://doi.org/10.1002/dys.1544>.
- Mayer RE (2016). How can brain research inform academic learning and instruction? *Educational Psychology Review* 29:1-12. <https://doi.org/10.1007/s10648-016-9391-1>.
- McGregor KK, Langenfeld N, Van Horne S, Oleson J, Anson M, Jacobson W (2016). The university experiences of students with learning disabilities. *Learning Disabilities Research and Practice* 31(2):90-102. <https://doi.org/10.1111/ldrp.12102>
- McMorris CA, Baraskewich J, Ames MA, Shaikh KT, Ncube BL, Bebko

- JM (2019). Mental health issues in post-secondary students with autism spectrum disorder: Experiences in accessing services. *International Journal of Mental Health and Addiction* 17(3):585-595. <https://link.springer.com/article/10.1007/s11469-018-9988-3>
- Missingham BD (2017). Asset-based learning and the pedagogy of community development. *Community Development* 48(3):339-350. <https://doi.org/10.1080/15575330.2017.1291528>.
- Moore P (2014). *Instinct vs insight: How should leaders make decisions?* London: The Guardian (Guardian News and Media Ltd). Retrieved March 10, 2021 from <http://careers.theguardian.com/careers-blog/instinct-insight-how-leaders-make-decisionsmanagement>.
- Moriña A (2017). Inclusive education in higher education: challenges and opportunities. *European Journal of Special Needs Education* 32(1):3-17. <https://doi.org/10.1080/08856257.2016.1254964>.
- NJCLD (National Joint Committee on Learning Disabilities) (2011). Comprehensive assessment and evaluation of students with learning disabilities: A paper prepared by the national joint committee on learning disabilities. *Learning Disability Quarterly* 34(1):3-16. <https://doi.org/10.1177/073194871103400101>.
- Oliver M, Sapey B, Thomas P (2012). *Social Work with Disabled People: Practical Social Work* (4th ed.). New York, NY: Palgrave MacMillan.
- Paris D (2012). Culturally sustaining pedagogy: A needed change in stance, terminology, and practice. *Educational Researcher* 41(3):93-97. doi.10.3102/0013189X12441244.
- Pashler H, McDaniel M, Rohrer D, Bjork R (2009). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest* 9(3):105-119.
- Pierangelo R, Giuliani G (2007). *The Educator's Diagnostic Manual of Disabilities and Disorders (EDM)*. San Francisco: John Wiley & Sons.
- Pino M, Mortari L (2014). The inclusion of students with dyslexia in higher education: A systematic review using narrative synthesis. *Dyslexia* 20:346-369. <https://doi.org/10.1002/dys.1484>.
- Proctor CM, Mather N, Stephens-Pisecco TL, Jaffe LE (2017). Assessment of dyslexia. *Communique* 46(3):1-23. <http://www.kasp.org/resources/Documents/Assessment%20of%20Dyslexia.pdf>.
- Reisman F, Severino L (2021). *Using Creativity to Address Dyslexia, Dysgraphia, and Dyscalculia: Assessments and Techniques*. New York, NY: Routledge.
- Richardson GD (2015). *Empowering academic success in postsecondary students who have dyslexia: Using strengths to break down barriers* (doctoral dissertation). Retrieved from ProQuest. (3680795).
- Saksida A, Iannuzzi S, Bogliotti C, Chaix Y, Demonet JF, Bricout L, Billard C, Nguyen-Morel MA, Le Heuzey MF, Soares-Boucaud I, George F, Ziegler JC, Ramus F (2016). Phonological skills, visual attention span, and visual stress in developmental dyslexia. *Developmental Psychology* 52(10):1503-1516. <http://dx.doi.org/10.1037/dev0000184>.
- Sharma M (2018). *Seeing deficit thinking assumptions maintain the neoliberal education agenda: Exploring three conceptual frameworks of deficit thinking in inner-city schools*. *Education and Urban Society* 50(2):136-154. <https://doi.org/10.1177/0013124516682301>.
- Smith-Spark JH, Henry LA, Messer DJ, Ziecik AP (2017). Verbal and non-verbal fluency in adults with developmental dyslexia: Phonological processing or executive control problems? *Dyslexia* 23(3):234-250. <http://dx.doi.org/10.1002/dys.1558>.
- Sniatecki JL, Pelz JA, Gates TG (2018). Human rights advocacy for students with disabilities: Challenging stigma and promoting opportunity in social work education. *Journal of Human Rights and Social Work* 3(4):183-190. <https://link.springer.com/article/10.1007%2Fs41134-018-0058-3>
- Stevens CM, Schneider E, Bederman-Miller P (2018). Identifying faculty perceptions of awareness and preparedness relating to ADA compliance at a small, private college in NE PA. *American Journal of Business Education* 11(2):27-40. <https://doi.org/10.19030/ajbe.v11i2.10142>.
- Stienen-Durand S, George J (2014). Supporting dyslexia in the programming classroom. *Procedia Computer Science* 27:419-430.
- Sunday T (2015). *Dyslexia's Competitive Edge: Business and Leadership Insights for Dyslexic Entrepreneurs, Business Owners, and Professionals*. North Charleston, SC: CreateSpace Independent Publishing Platform.
- Swanson HL, Harris KR, Graham S (2014). *Handbook of learning disabilities* (2nd ed.). New York, NY: The Guilford Press.
- Trent SC, Artiles AJ, Englert CS (1998). From deficit thinking to social constructivism: A review of theory, research, and practice in special education. *Review of Research in Education* 23:277-307. <https://doi.org.libproxy.lib.csus.edu/10.2307/1167293>.
- US Department of Education (USDE) (2012). Sec. 602.30 definitions. *Building the legacy: IDEA 2004*. Washington, DC: USDE. Retrieved from <http://idea.ed.gov/explore/view/p/%2Croot%2Cstatute%2CI%2CA%2C602%2C30%2C>.
- US Department of Education (USDE), National Center for Education Statistics. (2017). *The condition of education 2017 (NCES 2017-144)*, undergraduate retention, and graduation rates.
- Vygotsky LS (1978). *Mind in society: The development of higher psychological processes*. London: Harvard University Press.
- Widharyanto B, Binawan H (2020, June). Learning style and language learning strategies of students from various ethnics in Indonesia. *Cakrawala Pendidikan* 39(2). <https://doi.org/10.21831/cp.v39i2.28173>.
- Waterfield B, Whelan E (2017). Learning disabled students and access to accommodations: Socioeconomic status, capital, and stigma. *Disability and Society* 32(7):986-1006. <https://doi.org/10.1080/09687599.2017.1331838>.
- Waitoller FR, King Thorius KA (2016). Cross-pollinating culturally sustaining pedagogy and universal design for learning: Toward an inclusive pedagogy that accounts for dis/disability. *Harvard Educational Review* 86(3):366-389. <https://doi.org/10.17763/1943-5045-86.3.366>.
- World Health Organization World Bank (WHO) (2011). "World report on disability 2011." World Health Organization. Retrieved from <https://apps.who.int/iris/handle/10665/44575>
- Xu W (2011). Learning styles and their implications in learning and teaching. *Theory and Practice in Language Studies* 1(4):413-416. Finland: Academy Publisher. <https://doi.org/10.4304/tpls.1.4.413-416>.
- Yeom HG, Kim JS, Chung CK (2020). Brain mechanisms in motor control during reaching movements: Transition of functional connectivity according to movement states. *Scientific Reports* 10(567):1-10. <https://doi.org/10.1038/s41598-020-57489-7>.
- Zablotsky B, Black LI, Maenner MJ, Schieve LA, Danielson ML, Bitsko RH, Blumberg SJ, Kogan MD, Boyle CA (2019). Prevalence and trends of developmental disabilities among children in the United States: 2009–2017. *Pediatrics* 144(4):e20190811. <https://doi.org/10.1542/peds.2019-0811>.